UMC 783.14 Geology

The following is a general description of the geology of the mine plan area. There are no coal seams underneath the surface operations and no overburden to be removed. Cut and fill areas for the surface facilities and roads require only shallow cuts be made. Road cut and fill is described in the enclosed Dames and Moore report on soil stability.

The coal seam is to be entered through an old existing mine. The analyses of the coal and roof and floor rock are of samples taken inside the mine rather than core samples. A copy of these analyses is included in this folder.

Exibit VI a

E

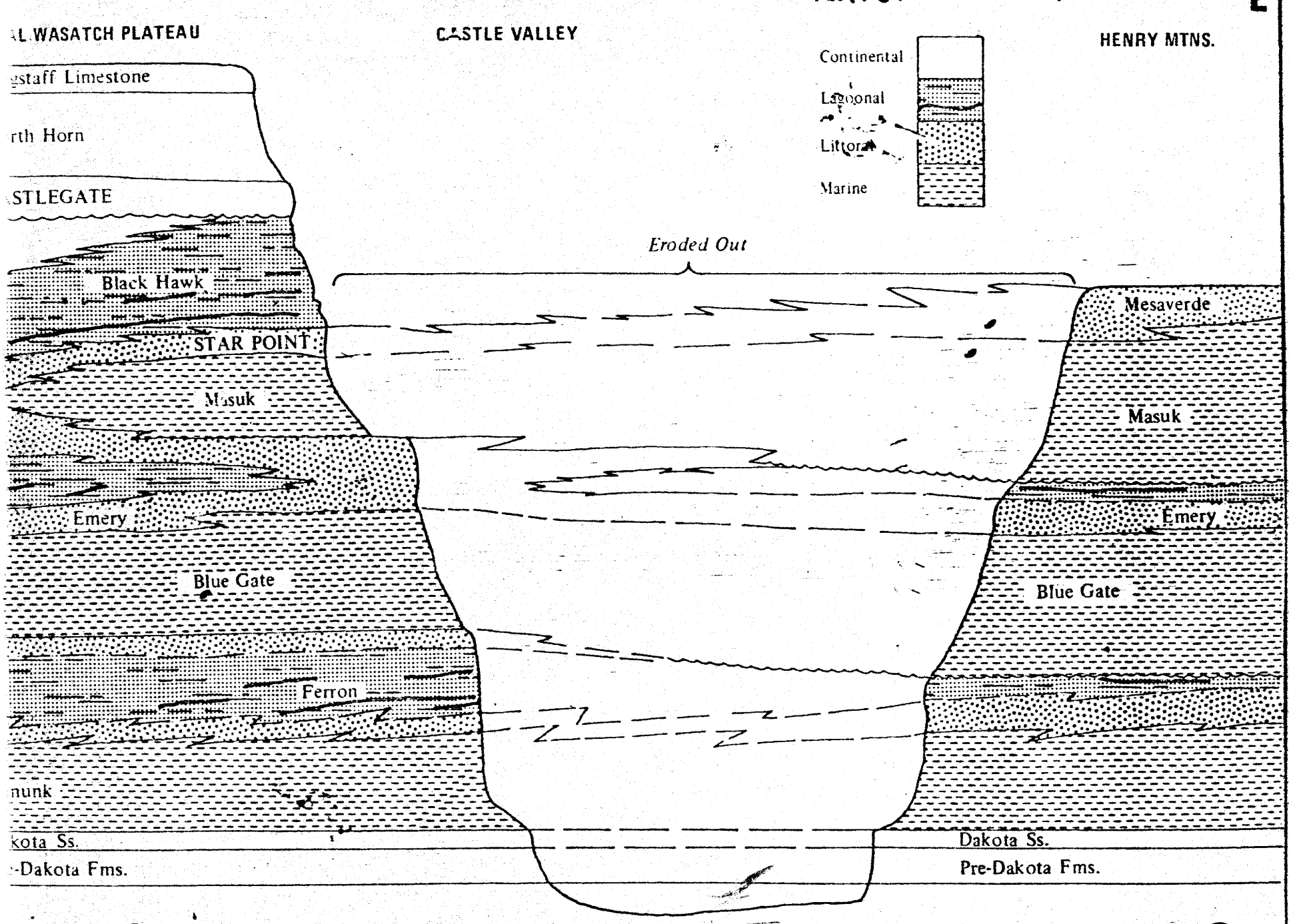

Figure 13. Stratigraphic correlation diagram from central Wasatch Plateau to the Henry Mountains.

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SCOPE OF PROJECT - SETTING

Field reconnaissance and mapping were performed in the Bear Creek Canyon area of lower Huntington Canyon during the month of June, 1980 in order to evaluate the mineability and coal resources of selected federal and fee coal leased lands. Figure 1 (following page) shows the general location of the project.

This report is a synthesis of existing published data and data gathered during field work by employees of Sanders Exploration, Limited. Work accomplished in the field included walking along the outcrop (where physically possible), hand trenching of the outcrop and measurement of the exposed coal sections. Elevation control of the coal horizon was determined by an altimeter calibrated daily with a map point of known elevation.

Bear Creek Canyon is located in Emery County, Utah approximately ten miles west northwest along State Highway 31 from the town of Huntington in the southeast portion of Township 16 South, Range 7 East, S.L.B. & M. The "site specific area" falls within the confines of the Wasatch Plateau Physiographic Province and is considered part of the Central Utah or Wasatch Plateau Coal Field.

The study area is composed of precipitous step-like terrain (cliffs alternating with steep slopes) which posed numerous, sometimes insurmountable access problems with regard to following the coal outcrop. Canyons visited during the reconnaissance (Bear Canyon and related drainage areas) are intermittent and perennial tributaries of Huntington Creek.

3

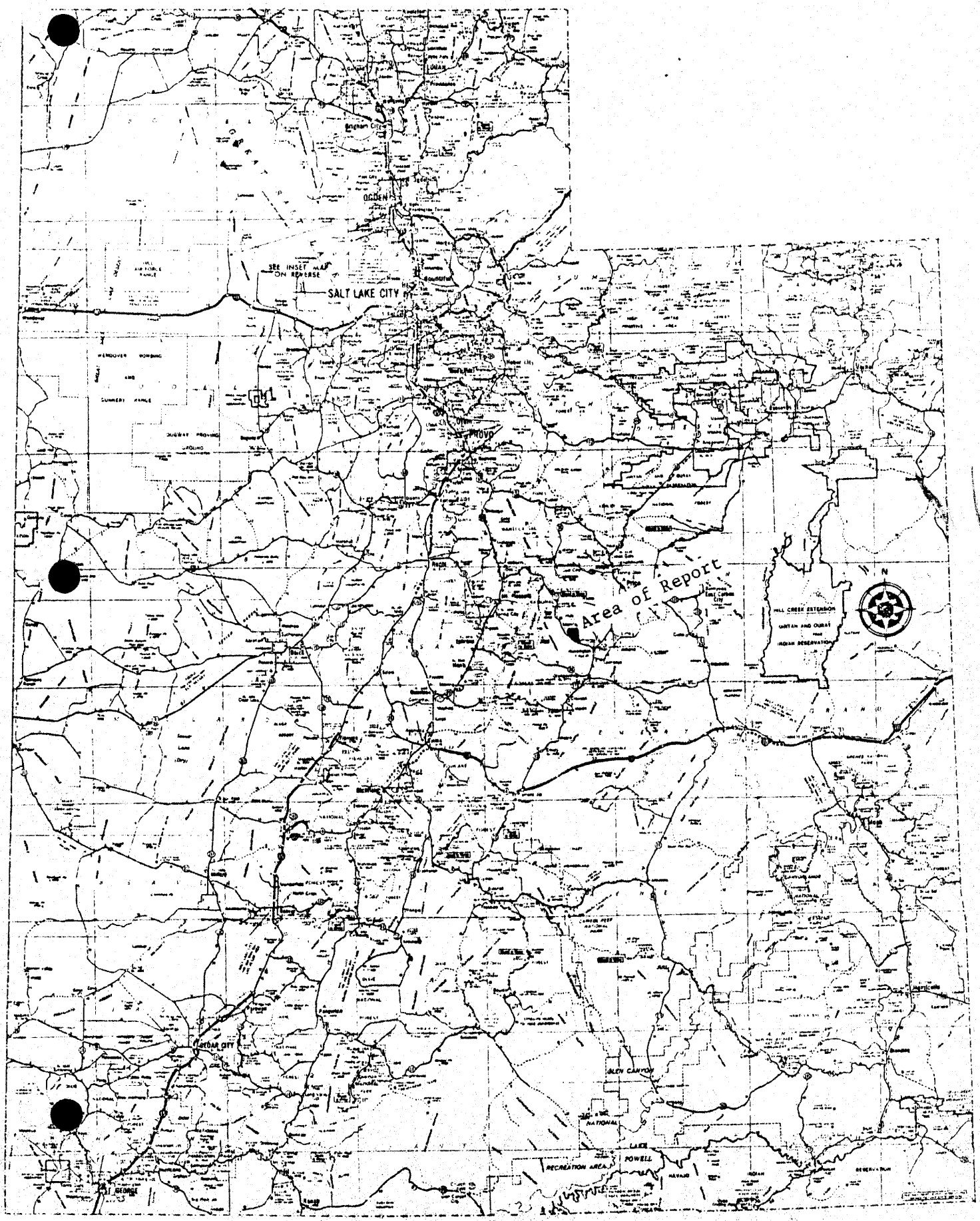
SALT LAKE CITY
OGDEN
PROVO
SEE INSET MAP ON REVERSE
Area of Report
N
GLEN CANYON
NATIONAL
RECREATION AREA
LAKE
POWELL
CEDAR CITY
ST. GEORGE

Figure 1

The study area is relatively sparsely vegetated in most places and the climate is arid. The closest railhead is in Price, Utah approximately 35 miles by paved road. Elevations in the area range from 6,400 feet to 9,300 feet with an overall relief of 2,900 feet.

GEOLOGY

General Stratigraphy

The exposed geologic column, in ascending order, consists of the Mancos Shale, the Star Point Sandstone, the coal-bearing Blackhawk Formation and the Castlegate Sandstone Member of the Price River Formation. All of these geologic units are Cretaceous in age. The Star Point Sandstone through the Price River Formation composes the Mesaverde Group in this locality.

The Mancos Shale forms the initial steep slopes rising from the washes which in turn is overlain by the initial cliff-forming Star Point Sandstone ("....thick-bedded to massive beds separated by subordinate Mancos-like shale".)[1]

The Blackhawk Formation is composed of alternating sandstones, shales, mudstones and coal representing marine, transitional and terrestrial varieties of sedimentation. Depositional environments of the Blackhawk Formation include littoral, lagoonal, estaurine and swamp type environments. The

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[1] 1972, Central Utah Coal Fields: Sevier-Sanpete, Wasatch Plateau, Book Cliffs and Emery, Monograph Series No. 3, U.G.M.S., H.H. Doelling.

Blackhawk outcrops to form a step and slope topography slightly less resistant than the Star Point below and the Castlegate above. Multiple coal seams are found within the lower 350 feet of the Blackhawk.

The Castlegate Member of the Price River Formation makes up a massive, resistent cliff-former above the Blackhawk.

Structure

The Bear Canyon fault, which is part of the north-south trending Pleasant Valley fault zone, is the only major structural feature in the study area which has any effect on the mineability and continuity of the coal. Displacement on this particular fault is estimated by the author to be 200'+ in the vicinity of Bear Creek Campground on the north side of State Highway 31 (Enclosure 1 and photograph in Appendix). The west side of the fault is down relative to the east side. In the vicinity of the Bear Canyon Mine, Section 24, Township 16 South, Range 7 East, the fault is buried by alluvium, however, the fault trace expresses itself in the falls in the NW¼, NW¼ of Section 24, Township 16 South, Range 7 East and displacement at this point is apparently less than five feet. Strata immediately bordering the fault is disturbed and inconsistent in spatial attitude with equivalent strata in the study area east of the Bear Canyon fault. This will no doubt have a limiting effect on the extent to which coal can be mined in the immediate vicinity of the fault. The Bear Canyon fault marks the western boundary of the study area.

Strata east of the fault are nearly horizontal in attitude providing excellent mining conditions. Coal outcrops slightly lower in elevation in the southern portion of the area than in the northern portion.

Small faults noted in the field along outcrop were interpreted to be largely of non-tectonic origin (e.g. landslide and slump) by the author. Other faults observed did not express displacement of sufficient magnitude to be prohibitive to mining.

Coal

Multiple coal seams are found in the lower 350 feet of the Blackhawk Formation as was previously mentioned. In ascending order the seams are as follows: Hiawatha, Blind Canyon, Bear Canyon and the upper beds,[1] (see Table 1 - following page).

None of the coal lies at depths of more than 1,800 in the study area. Depth should not be a limiting factor in mining.

It was noted in the field that strata situated at elevations consistent with the upper beds structural horizon were badly burned and not of economic importance.

The Blind Canyon and Bear Canyon seams were measured and observed at various points in the study area by the author, however, these seams were traceable only locally in Bear Canyon (Enclosure 1). Limited traceability of these two seams is attributed to the lenticular nature of the seams, the extent of slope debris acting as cover and/or depositional irregularities.[2]

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[2] 1931, The Wasatch Plateau Coal Field, Utah, U.S.G.S. Bulletin 819, E.M. Spieker.

7

LOWER HUNTINGTON CANYON	FEET
Upper beds	0-6
Interval	200
Bear Canyon bed	0-10
Interval	40-60
Blind Canyon bed	0-10
Interval	40-60
Hiawatha	5-8
Star Point Sandstone	

Author's Note: Hiawatha to Blind Canyon interval can be as great as 110 feet.

TABLE 1 (AFTER DOELLING, 1972)

H.H. Doelling indicates the Bear Canyon seam is present in Left Fork of Fish Creek Canyon (east of Bear Creek Canyon) with a thickness of 6.5 feet, however, this measurement was not verified.(1) Doelling also has a 17.3 foot measurement in the Bear Canyon seam in Bear Creek Canyon that was not verified in the field possibly because this particular exposure has since been covered by slope debris.

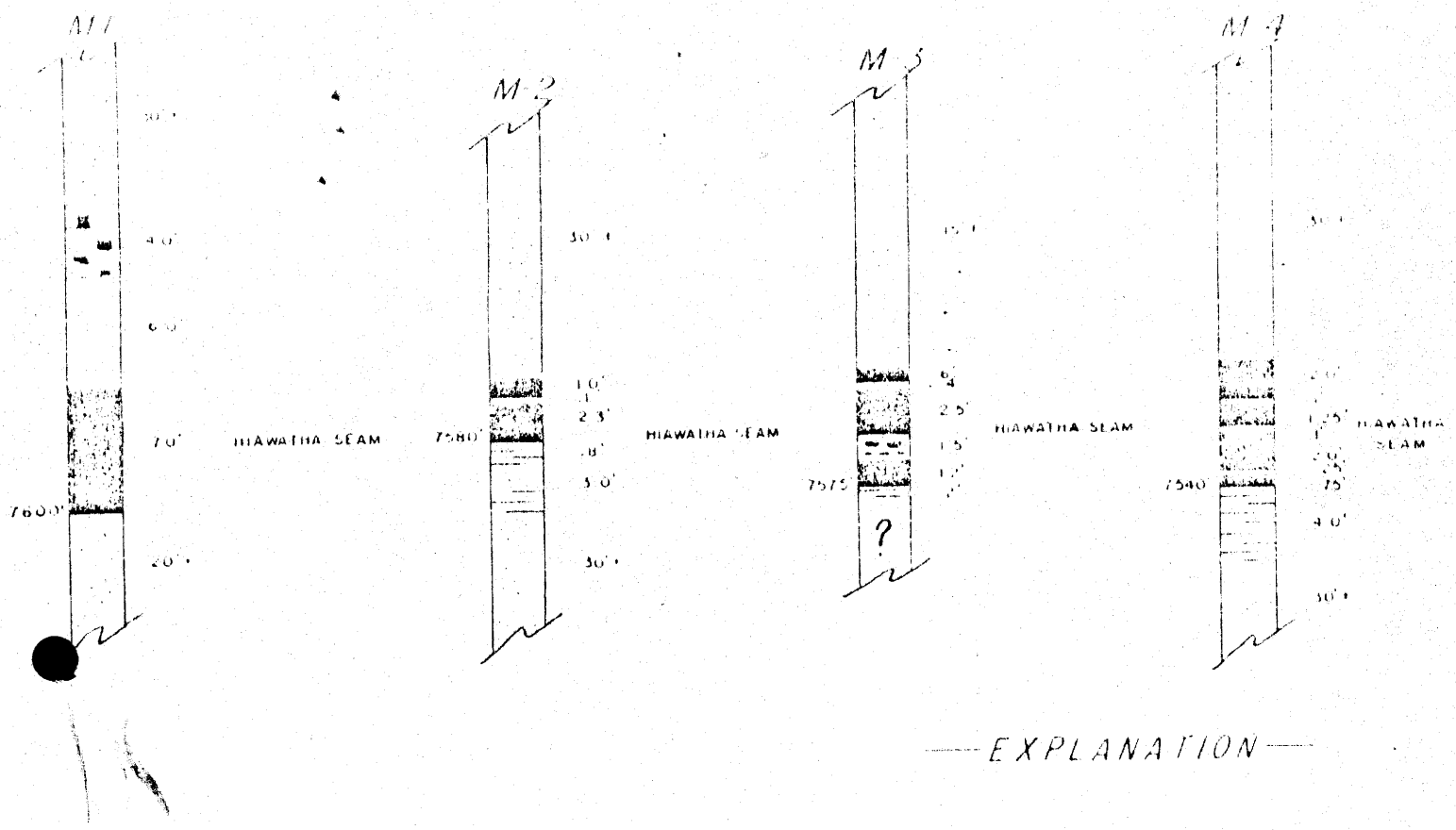
A small adit approximately 50 feet in length and interpreted as penetrating the Bear Canyon seam (measurement M-5) and a longer adit approximately 300 feet in length and interpreted as penetrating the Blind Canyon seam (measurement M-7), were discovered in Bear Creek Canyon, Section 24, Township 16 South, Range 7 East. The full extent and history of these workings is not known. The fact that these two seams are not traceable for any significant areal extent beyond these old workings indicates the subordinate nature of the Bear and Blind Canyon seams.

In the SW¼, SW¼ of Section 24, Township 16 South, Range 7 East the Bear Canyon Mine is located. Two seams were worked there, the upper of which is the Bear Canyon seam (elevation 7,420 feet) and the lower of which is the Hiawatha seam (elevation 7,340 feet). This interpretation is based on the seams stratigraphic position above the Star Point Sandstone. The Blind Canyon seam apparently has pinched out or been replaced in this locality. The mine lies on the west side of the Bear Canyon fault. The presence of the Hiawatha and Bear

Canyon seams at the mine lend credence to the author's opinion that these seams are probably present across canyon to the east where they were not traceable nor measurable due to slope cover.

The Hiawatha seam was identified throughout the majority of the study area based on its stratigraphic relationship with the underlying Star Point Sandstone. The Star Point Sandstone is continuous and conspicuous within the area covered by this report. While the Hiawatha seam was not measured in Left Fork of Fish Creek Canyon by this author or previous investigators (i.e. E.M. Spieker, H.H. Doelling), the presence of the Reichert Mine (Hiawatha seam - after Doelling) in Section 20, Township 16 South, Range 8 East suggests the interstitial presence of the Hiawatha seam in Left Fork. Where identified and measured, the Hiawatha seam achieved mineable thickness in all but one instance (3.3 feet - measurement M-2). However, coal thickness at outcrop is invariably thinner than the subsurface thickness. The Hiawatha seam averages 5.96 feet in thickness in the area inspected. Specific work accomplished is shown on the geologic map (Enclosure 1) and columnar outcrop sections (Figure 2 - following pages).

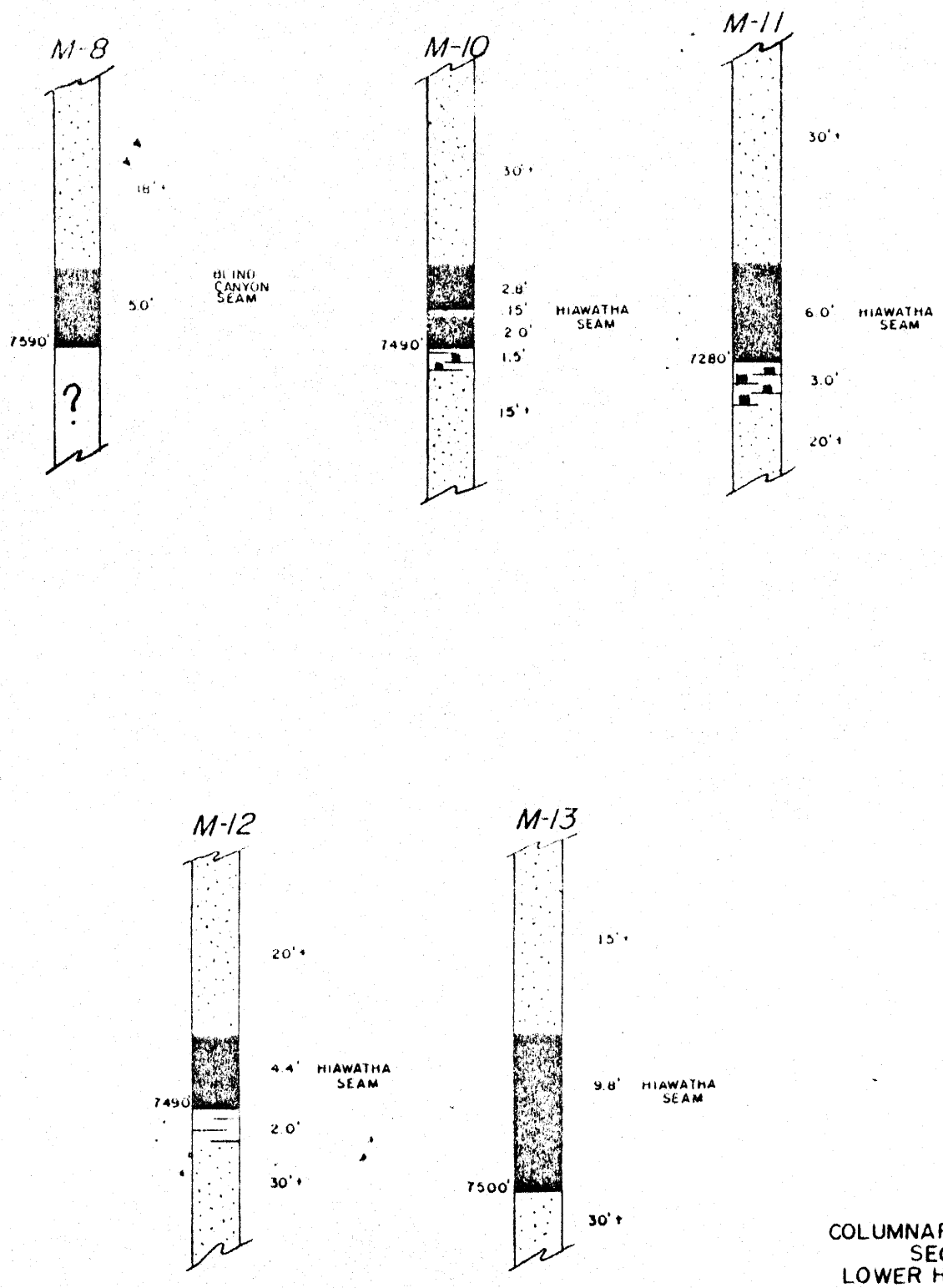
Well consolidated sandstone forms the roof and floor of the Hiawatha seam in the majority of locations inspected along outcrop. This situation provides excellent mining conditions and high coal recovery percentages as is demonstrated by 90 to 96 percent recovery of the Hiawatha seam at the King Mine approximately five miles NNE of the study area.[1]



COLUMNAR OUTCROP SECTIONS LOWER HUNTINGTON CANYON EMERY COUNTY, UTAH

Vertical Scale 1" = 10'

11

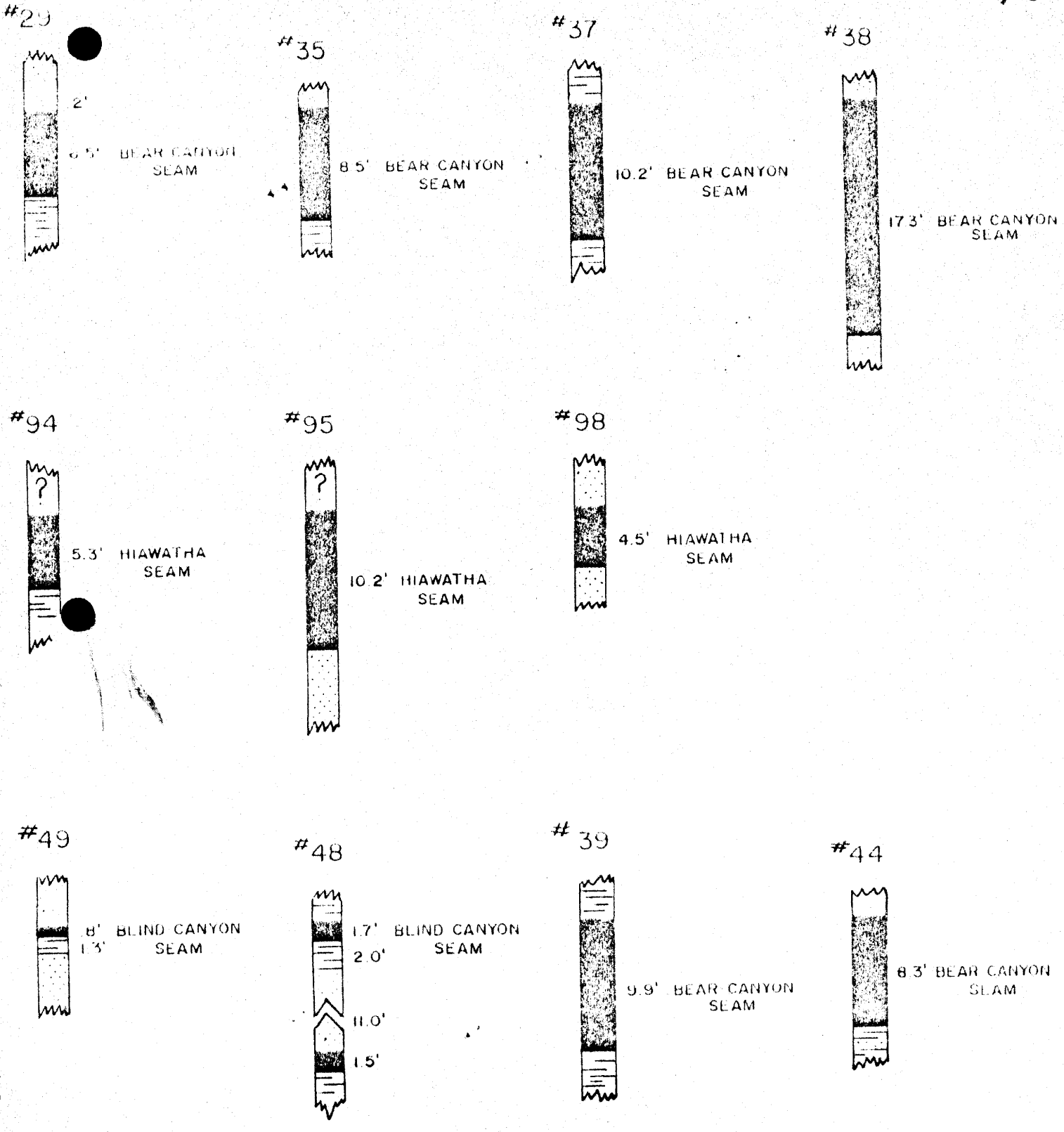


COLUMNAR OUTCROP SECTIONS LOWER HUNTINGTON CANYON EMERY COUNTY, UTAH

Figure 2

Vertical Scale 1"=10'

12



COLUMNAR OUTCROP SECTIONS
(after Doelling, 1972)
LOWER HUNTINGTON CANYON
EMERY COUNTY, UTAH

Figure 2

Doelling states that "extensive mining under Gentry Mountain (a short distance due north of Bear Creek Canyon) reveals that the Hiawatha is continuous in the anticipated thicknesses". (1)

Mining access to the Hiawatha seam appears the best in the SW¼ SE¼ of Section 24, Township 16 South, Range 7 East, Bear Creek Canyon. The continuity of this seam appears favorable for mining even though, as was the case in the majority of the area studied, slope cover reduced the number of possible measurements and this was further limited by access difficulties.

Burning of the coal is associated predominately with the upper beds. While burn was noted at the Hiawatha, Blind Canyon and Bear Canyon seams structural horizons at various locations, it is the author's opinion that these burns are discontinuous and localized in nature (Enclosure 1). There are no drill holes in the vicinity. This prohibits subsurface correlation beyond what can be gleaned from inspection of the outcrop.

Coal Quality

The following Table (after Doelling, 1972) provides some indication of the average coal quality of the three seams of consequence. Further, more detailed quality analyses can only be obtained through a drilling/coring program (see Conclusion-Recommendations). Average coal analyses (after Doelling) indicates that the coal present in the Hiawatha, Blind Canyon and Bear Canyon seams ranks high volatile C bituminous coal (1,800 short tons per acre foot).

AVERAGE COAL ANALYSES, HIAWATHA NE QUADRANGLE

	No. Analyses	As-received (percent)	
		Average	Range
BEAR CANYON BED			
Moisture	6	6.8	4.5-10.9
Volatile matter	6	43.8	37.4-46.0
Fixed carbon	6	45.7	44.9-46.0
Ash	6	4.5	3.8- 5.8
Sulfur	6	0.53	0.5- 0.6
Btu/lb	6	13,014	10,840-13,530
BLIND CANYON BED			
Moisture	10	4.8	3.8- 5.3
Volatile matter	9	41.7	40.2-44.7
Fixed carbon	9	44.3	39.2-48.3
Ash	10	8.9	5.8-12.4
Sulfur	8	0.58	0.5- 0.6
Btu/lb	9	12,702	11,700-13,080
HIAWATHA BED			
Moisture	370	5.6	0.7 -11.0
Volatile matter	357	42.3	36.3 -46.4
Fixed carbon	357	45.7	38.3 -52.7
Ash	359	6.2	3.3 -11.2
Sulfur	330	0.61	0.29- 1.1
Btu/lb	365	12,719	11,521-13,600

TABLE 2 (AFTER DOELLING, 1972)

RESERVES

Reserves were calculated in accordance with criteria established in Geological Survey Bulletin 1450-B, Coal Resource Classification System of the U.S. Bureau of Mines and U.S. Geological Survey and General Mining Order No. 1 (effective March 1, 1980). Coal thickness used to determine the reserves (Table 3), was averaged from the author's outcrop measurements and previously published outcrop measurements (after Doelling, 1972). Average seam thicknesses used to determine the reserves are as follows:

Hiawatha Seam 5.96 feet

Blind Canyon Seam 6.6 feet

Bear Canyon Seam 9.7 feet

Due to lack of data in the northern and eastern portions of the study area, an isopach determination of the reserves was not possible. See Coal Reserve Base Maps (Enclosures 2, 3 and 4).

RECOMMENDATIONS AND CONCLUSIONS

It is the author's opinion that the Hiawatha seam is mineable and continuous within the federal and fee coal leased lands embraced in this report and that through further investigation, a moderate sized mine of merit could be established.

A drilling program is recommended in order to further define coal quality and the subsurface nature of the Hiawatha seam, as well as the subsurface extent and nature of the

Bear Canyon and Blind Canyon seams. At present, not enough geologic data are available on the Bear and Blind Canyon seams in the study area to justify a conclusion concerning the mineability and continuity of these two seams.

Possible drill hole locations and proposed total depths are found on the geologic map (Enclosure 1). Access roads for the drill rig and support equipment would have to be built and must be a consideration in future cost analyses.

Exibit VI b page 1

S.	Series	Stratigraphic Unit		Thickness (feet)	Description
TERTIARY	Eocene	Green River Formation		–	Chiefly greenish lacustrine shale and siltstone.
		Wasatch Group	Colton Formation	300-1,500	Varicolored shale with sandstone and limestone lenses, thickest to the north.
	Paleocene		Flagstaff Limestone	200-1,500	Dark yellow-gray to cream limestone, evenly bedded with minor amounts of sandstone, shale and volcanic ash, ledge former.
			North Horn Formation (Lower Wasatch)	500-2,500	Variegated shales with subordinate sandstone, conglomerate and freshwater limestone, thickens to north, slope former.
	?				
	Maestrichthian	Mesaverde Group	Price River Formation	600-1,000	Gray to white gritty sandstone interbedded with subordinate shale and conglomerate, ledge and slope former.
			Castlegate Sandstone	150- 500	White to gray, coarse-grained often conglomeratic sandstone, cliff former, weathers to shades of brown.
			Blackhawk Formation *MAJOR COAL SEAMS*	700-1,000	Yellow to gray, fine- to medium-grained sandstone, interbedded with subordinate gray and carbonaceous shale, several thick *coal* seams.
CRETACEOUS	Campanian		Star Point Sandstone	90-1,000	Yellow-gray massive cliff-forming sandstone, often in several tongues separated by Masuk Shale, thickens westward.
	Santonian	Mancos Shale	Masuk Shale	300-1,300	Yellow to blue-gray sandy shale, slope former, thick in north and central plateau area, thins southward.
			Emery Sandstone *COAL (?)*	50- 800	Yellow-gray friable sandstone tongue or tongues, cliff former, may contain *coal* (?) in south part of plateau if mapping is correct, thickens to west and south. *Coal* may be present in subsurface to west.
	Coniacian		Blue Gate Member	1,500-2,400	Pale blue-gray, nodular and irregularly bedded marine mudstone and siltstone with several arenaceous beds, weathers into low rolling hills and badlands, thickens northerly.
	Turonian		Ferron Sandstone Member *MAJOR COAL SEAMS*	50- 950	Alternating yellow-gray sandstone, sandy shale and gray shale with important *coal* beds of Emery coal field, resistant cliff former, thickens to the south.
	Cenomanian		Tununk Shale Member	400- 650	Blue-gray to black sandy marine slope forming mudstone.
	Albian	**Dakota Sandstone** *MINOR COAL*		0- 60	**Variable assemblages of yellow-gray sandstone, conglomerate shale and *coal*. Beds lenticular and discontinuous.**

Figure 5. Generalized section of rock formations, Wasatch Plateau coal field.

EXHIBIT VI C

page 1

Sample No. WP-8-75 U.S.G.S. Serial No. D174679

Location Co-op Mine

Face channel Sample

Sec. 22, T. 16 S., R. 7 E.

Seam Bear Canyon Seam Formation Blackhawk

Thickness Sampled 7' Date Sampled May 8, 1975

Proximate Analysis

	AD	AR	Dry	MAF
M	4.4	6.1		
VM	45.6	44.8	47.7	50.8
FC	44.1	43.3	46.2	49.2
Ash	5.9	5.8	6.1	
Btu/lb.	13140	12910	13740	14640

Ultimate Analysis

	AD	AR	Dry	MAF
H	5.9	5.9	5.6	6.0
C	72.6	71.4	76.0	80.9
N	1.3	1.3	1.4	1.5
O	13.8	15.1	10.4	11.1
S	0.5	0.5	0.5	0.5

FORMS OF SULFUR:

	Sulfate	Pyritic	Organic
As-received	0.02	0.16	0.30
Moist.-free	0.02	0.17	0.32
M. and ash-free	0.02	0.18	0.35

Free-swelling index No. 2 1/2

TRACE ELEMENTS BY VARIOUS DETERMINATIONS (Coal as received)

Cl (ppm) 1 F (ppm) <20 Hg (ppm) 0.03 Sb (ppm) 0.1 Se (ppm) 1.3

TRACE ELEMENTS, MOSTLY ATOMIC ABSORPTION ON ASH

Na2O % 2.33 Cu (ppm) 97 Zn (ppm) 19

K2O % 2.96 Li (ppm) 84 Mn (ppm) 200

As (ppm) <1 Pb (ppm) 25

DELAYED NEUTRON DETERMINATION OF URANIUM AND THORIUM

Th ppm 5.0247 ppm U

SEMIQUANTITATIVE 6-STEP SPECTROGRAPHIC ANALYSIS OF THE ASH

(Greater than 10%; N=Not detected; L=Detected, but below limit of determination)

Si	5.0 %	Be (ppm)	N	Pb (ppm)	30	W (ppm)	N	Ba	N
Al	1.5 %	Bi	N	Pd	N	Y	30	La	N
Fe	G %	Cd	N	Pt	N	Zr	N	Th	N
Mg	0.3 %	Co	10	Sb	N	Sr	200	U	N
Ti	--- %	Cr	70	Sc	15	Ce	N	Mo	3
Mn	150 (ppm)	Cu	70	Sn	N	Ga	20	Ag	N

As (ppm)	N	La (ppm)	N	Sr (ppm)	500	Ce (ppm)	20	Al %	7.0
Au	N	Mo	15	Te	N	Hf	N	Na %	---
B	1500	Nb	L20	U	N	In	N	K %	N
Ba	1500	Ni	20	V	70	Li	N	P %	N

CODED FOR ONLY WHEN La OR Ce FOUND:

Ce		Fusibility of ash temp. °F.
Nd		Initial Deform. ------2190
Sm		Softening ----------2250
Eu	N	Fliud ----------2300

Ash composition

AL2O3 -------11.0%
SO3 ---------~~1.9%~~ 8.4%
CL ----------0.10%
CAO ---------24.0%
SIO2 --------~~25.0%~~ 24.0%
P2O5 --------0.74%
TIO2 --------0.71%
MnO ---------0.020%
FE2O3 -------7.6%
K2O ---------0.17%

% Ash determined gravimetrically ashed at 525° C. -6.8%

2

CABLE ADDRESS COMTECO

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

PLEASE ADDRESS ALL CORRESPONDENCE TO:
10775 EAST 51st AVE., DENVER, COLO. 80239

OFFICE TEL. (303) 373-4772

CO-OP MINING COMPANY
53 West Angelo
Salt Lake City, Utah 84115

May 9, 1977

		Sample Identification
		Co-op Mining Co.
Kind of Sample reported to us	Coal	One Bag Dry Coal
Sample taken at	xxxxx	
Sample taken by	Co-op Mining Co.	
Date Sampled	4-20-77	
Date Received	4-25-77	

Analysis report no. 72-57043 Page 2

MINERAL ANALYSIS OF ASH	Percent Weight Ignited Basis
Silica, SiO_2	41.52
Alumina, Al_2O_3	19.42
Titania, TiO_2	0.92
Ferric oxide, Fe_2O_3	5.72
Lime, CaO	17.95
Magnesia, MgO	1.45
Potassium oxide, K_2O	0.96
Sodium oxide, Na_2O	2.44
Sulfur trioxide, SO_3	8.78
Phos. pentoxide, P_2O_5	0.17
Undetermined	0.67
	100.00

Alkalies as Na_2O, Dry Coal Basis	0.28
Silica Value	62.30
Base: Acid Ratio	0.46

ESTIMATED VISCOSITY at critical viscosity
Temperature of 2330 °F = 270 Poise
T_{250} Temperature = 2340 °F

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

DWP/ap

Exibit VI-F
page 1

F-464

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

WESTERN DIVISION MANAGER
LLOYD W. TAYLOR, JR.

PLEASE ADDRESS ALL CORRESPONDENCE TO:
10775 EAST 51st AVE., DENVER, COLO. 80239
OFFICE TEL. (303) 373-4772

CO-OP MINING COMPANY
Box No. 300
Huntington, Utah

June 25, 1979

Kind of sample reported to us	Roof Rock
Sample taken at	xxxxx
Sample taken by	CO-OP Mining Co.
Date sampled	xxxxx
Date received	5-24-79

Sample identification by

CO-OP Mining Co.

Sample No. 57-2163 (CT&E Helper)
CO-OP Mine No. 2
Huntington Canyon

Analysis report no. 72-82661

SOIL ANALYSIS

pH	8.7
Sodium	12.5
Calcium	.34
Magnesium	.76
Sodium Adsorption Ratio	16.9
Pyrite (as S-$CaCO_3$ eq t/1000')	0.0
Sand %	
Silt %	
Clay %	

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Gail D. Palmer

G. D. PALMER, Manager, Denver Laboratory

Charter Member

F-464

COMMERCIAL TESTING & ENGINEERING CO.

2

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

WESTERN DIVISION MANAGER
LLOYD W. TAYLOR, JR.

PLEASE ADDRESS ALL CORRESPONDENCE TO:
10775 EAST 51st AVE., DENVER, COLO. 80239
OFFICE TEL. (303) 373-4772

CO-OP MINING COMPANY
Box No. 300
Huntington, Utah 84528

June 25, 1979

Sample identification by

Floor Rock	CO-OP Mining Co.
XXXXX	Sample No. 57-2162 (CP&L Helper)
CO-OP Mining Co.	CO-OP Mine No. 2
XXXXX	Huntington Canyon
5-24-79	

Analysis report no. 72-82660

SOIL ANALYSIS

pH	8.4
Sodium	5.4
Calcium	.61
Magnesium	4.4
Sodium Absorption Ratio	6.4
Pyrite (as $S-CaCO_3$ eq t/1000T	0.0
Sand %	65
Silt %	26
Clay %	9

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

G. D. PALMER, Manager, Denver Laboratory

CDP/ag

Original Copy Watermarked
For Your Protection

Charter Member

Exibit VI--'g'

Coal reserves Bear Canyon

388 Acres @ 20,900 T. per A.	@50% recovery	4,054,600	(Bear Canyon seam)
28 Acres @ 19122 T. per A.	@ 50% recovery	267,708	(Bear Canton seam)
456 Acres @ 10,450 T. per A.	@ 50% recovery	2,382,600	(Hiawatha seam)

(Survey not yet completed for upper Bear seam)

Total 6,704,908

783.25 Cross sections, Maps and Plans

See enclosed Cross sections and Maps

UMC 784,11 Operation plan

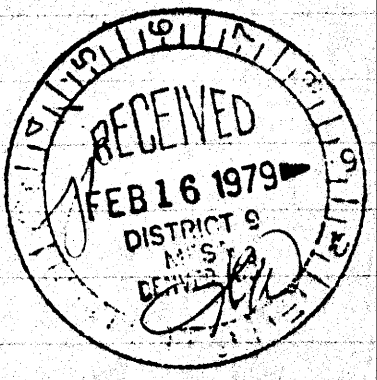
The following is a description of the proposed mining operation includung mining procedures and engineering techniques, also annual and total production of coal anticipated, a map of the existing mine, and the proposed areas of annual development. Also included is a list of the surface and underground equipment to be used.

Construction and use of dams, embankments, ponds, and other water pollution control facilities are indicated on the enclosed maps. Coal handling facilities include a primary surge bin, crushig and sizing equipment inclosed in a steel structure, conveyor belts carrying the coal to stockpiling towers, and truck loading conveyors. These are also indicated on the enclosed maps.

Removal of the above will be as described in the included section on reclamation.

EXHIBIT III -
page 1 Trial

CO*OP MINING COMPANY
P.O. Box 300
Huntington, Utah 84528



2-21-1979

Feb. 13, 1979

U.S. Department of Labor
Mine Safety and Health Administration
P.O. Box 25367
Denver, Colorado 80225

RE: EMS-DO--6026

To Whom it May Concern:

Enclosed is a copy of a proposed roof control plan for the subject mine. Please accept our apologies for any inconvience to you resulting from delay in submitting this plan.

There are at this mine, three general conditions which we feel should receive particular attention in setting forth a written plan of roof support.

The most common roof condition encountered in mining at the subject mine is that of development mining where the main immediate roof is coal. The proposed roof control procedures for this type of mining will be outlined in "Part A" of the enclosed roof control plan.

The next most common roof condition contended with at this mine is the roof conditions encountered in retreat mining. The proposed roof control procedures for this type of mining will be outlined in "Part B" of the enclosed roof control plan.

Recently we have encountered conditions which resulted in mining where the main immidiate roof was rock. The proposed roof control procedures for this type of mining will be outlined in "Part C" of this enclosed roof control plan.

It is to be understood, that the support as provided in the enclosed plan represents guidelines for minimum roof support under normal mining conditions as outlined in Parts "A" - "B" - and "C" of the enclosed roof support plan.

Faults, slips, fractures, and other abnormal conditions evidencing questionable roof will be analized by appropriate persons involved with mining in such areas and additional roof support will be installed as needed for the protection of those working in such areas.

More than one size or type of roof support material may be included in the list of materials to be used in one or more parts of the enclosed plan. (i.e. bolts of different lengths, or types, supplied by different manufactures would be an example of such items). Any or all of the items included in materials listed may be used provided that minimum numbers of bolts/ and or parts are used as outlined in each part.

2

POST A COPY OF THIS PLAN NEAR EACH PORTAL WHERE WORKERS ENTER THE MINE IN SUCH A MANNER ~~THAT SAID PLAN WILL BE~~ AVAILABLE TO THE MINE WORKERS.

ROOF CONTROL PLAN

General Information

Date Feb 13, 1979 Mine I.D. NO. 42-00081

A. Company Co-op Mine

Address Huntington Utah

B. Mine Co--op Mine

Mine Location

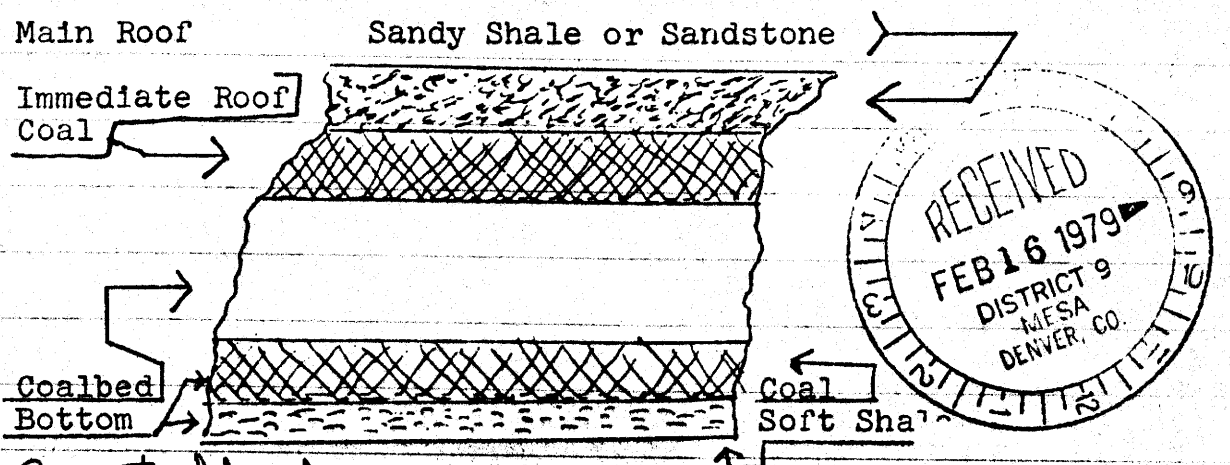
Huntington Emery Utah

C. Location (reference to nearest highway route, direction, and distance) 1/2 miles North Off Route No.

D. Types(s) of Plan: Part "A" Basic roof support with coal roof-(spot bolting) Part "B" roof support during retreat mining Part "C" roof support rock roof

E. Area(s) of mine covered by the plan: All Areas As Appropriate

F. Maximum cover: 1500 Feet.



G. R W Stoddard Operations Manager 2-13-79
Company Official's Signature Title Date

Roof Control Investigator C. Yudzish 2-28-79
The Roof Control Plan approved this date hereby supersedes all previously approved plans.

Approved by _____ Date

Title _____

H. Roof Bolts

Conventional Bolts

MFG	MFG designation
Patten-West	"D"
CF+I Co. Mico. Ind.	DON'T KNOW
(or equivalant)	

Minimum Length 48"
DIA 5/8" or 3/4"
Type steel XTRA HIGH STRENGTH / HIGH TENSIL STRENG
Type thread Rolled
Length of Thread 8"
Type head standard
Dimensions of Bolt head 15/16" & 1 1/8" (nut)
Flange 1 1/2" (MINIMUM)

Resin Bolts

MFG	MFG designation
Patten - West	# E
Mikco - (Steelco)	# 6

Minimum Length 48"
Diameter 3/4"
Type steel Grade "40" Rebar
Type head Standard
Dimensions of Bolt head
Nut 1 1/8" x 1 1/8"
Flange 2"

4

Resin

MFG: REX NORD SPECIALTIES CHEM. DIV. CELTITE INCORPORATED

MFG designation: NCRD-BAK MV-0001-37 OR EQUIVELANT

I. Bearing Plates

MFG: CLEARFIELD MFG

MFG designation: MINE ROOF PLATES (or equivelant)

Dimensions: 1/4" x 6" x 6" MINIMUM

Shape: SQUARE or Rectangular / Embossed or dished

Center Hole size: 7/8 (IF OVER 7/8- additional use of extra "HIGH STRENGTH" 7/8 FLAT washer IS USED WITH PLATE)

J. Washers: 7/8 HIGH STRENGHT Steel

MFG:

MFG designation:

Type steel "hardened"

Size: 1 1/4" dia (approx)

Shape: AUGER or HOLLOW ROUND

hole size: 1 3/8 - 1 1/2

K. Anchorage unit

MFG: OHIO BRASS

MFG designation: DON'T KNOW (Expansion Shell)

National Mine Service

5

Finishing Bit
Type

Size (plus/minus .030") 1 3/8" =

Installed torque

150 - 225 LBS/

L. Material used in conjunction with Roof Bolts

Wooden Cross Bars: *Crossbars, type and size--Crossbars shall be of straight grain solid wood and they shall be not less than 3--inches thick by 8--inches wide of varying length.

Wooden Planks: *Planks, size--A minimum of 1--inch thick by 8--inches wide of varying length. Cribbing blocks, size and shape-- Cribbing blocks shall have flat paralleled sides and be not less than 30--inches in length.

Wooden Boards Minimum of 1" thich by 8" wide by 10" long.

Mats

16 Gauge x 8½" x varied Lengths with Holes (Minimum size)

MANUFACTURED BY CLEARFIELD MFG.

(or equivalent)

M. ROOF SUPPORT MATERIAL--CONVENTIONAL OR TEMPORARY AND SUPPLEMENTAL

Dimensions of Post--The length of post shall be as required and diameter must be a leat 1 inch for each 15 inches in length but not less than 4 inches-- Split posts shall have a cross--dectional area equal to that required for round posts of equivalent length. Smaller posts may be used provided they are set in clusters to provide equivalent support.

Type of Post--Round or split of solid straight grain wood with the ends sawed square and free from defects which would affect their strength.

*Cap blocks, size, and shape--Cap Blocks and footers shall have flat paralleled sided and be not less than 4" (Insert Minimum) in size.

Wedges, size and shape--1/0" x 3 1/2 x 10" Minimum

*Crossbars, type and size--Crossbars shall be of straight grain solid wood and they shall be not less than 3-inches thick by 8-inches wide of varying length.

*PLanks, size--A minimum of ;--inch thick by 8-inches wide of varying length.

Cribbing blocks, size and shape--Cribbing blocks shall have flat paralleled sides and be not less than 30--inches in length.

*Note: Where wood material is used between roof bolt bearing plates and the roof for additional bearing surface, the use shall be limited to short life openings (not to exceed 3 years) unless treated.

N. FACE EQUIPMENT AND SECTION HAULAGE EQUIPMENT ASSOCIATED WITH EACH:

1. Lee Norse Miners
2. Acme Roof Bolter
3. Joy Roof Bolter
4. Lee Norse Roof Bolter
5. Diesel Shuttle Cars
6. Electric Shuttle Cars

O. SEQUENCE OF MINING AND INSTALLATION OF SUPPORTS INCLUDING TEMPORARY SUPPORTS: See Plan Part "A", "B", and "C"

SIGHT LINES SHALL BE ESTABLISHED TO ASSURE THAT MINING PROJECTIONS IN ENTRIES, ROOMS, CROSSCUTS, AND PILLAR SPITS ARE FOLLOWED.

Entry Width 18' --20' (generally 18') Centers 70' --100'

Crosscut Width 18'-- 20' (generally 18') Centers 75' -- 105'

Room Width 18'--20' (generally 20') Centers 60'--90'

Room Crosscut Width 18'--20' Centers 50'--100'

Slope Width (anthracite) DNA

Gangway Width (anthracite) DNA

TEMPORARY SUPPORTS

In one to two wooden wedges will be used to install each post.

Posts will not be installed under roof cover that is cracked or under disturbed roof with out a cap piece or crossbar between the post and the roof.

Posts should be installed tight and on solid footing.

Blocks used for lagging between the roof and wooden crossbars or metal bars will be crossed so that the load on the supports will be equally distributed.

Cap pieces will be used between posts and the roof.

"PLAN A"

SPOT BOLTING OF DOUBTFUL ROOF AREAS WHEN NORMAL MINING LEAVES COAL AS THE MAIN IMMEDIATE ROOF

SAFETY PRECAUTIONS

This is the minimum roof control plan and was formulated for normal roof conditions while using the mining system(s) described. In areas where subnormal roof conditions are encountered, indicated or anticipated, the operator shall provide additional support where necessary. If changes are to be made in the mining system that necessitates any change in the roof control plan, the plan shall be revised and approved prior to implementing the new mining system.

All personnel required to install roof supports shall be trained by a qualified supervisor designated by mine management before being assigned to perform such work. This training shall insure that such persons are familiar with the functions of the support being used, proper installation procedures, and the approved roof control plan.

Supervisors in charge and miners who install supports shall be informed of and approved roof control plan and any change in a previously approved roof control plan no later than their first working shift following receipt of the approved plan. As soon as possible, but not later than three weeks after receipt of this approved plan, all previsions contained herein shall be fully explained to all miners whose duties require them to be on a "working section". All new miners shall have the hazards of mine roof and ribs and the content of this plan explained to them before they start to work.

SPOT BOLTING SAFETY PRECAUTIONS TO BE TAKEN

Roof bolts (spot bolting) shall be installed in accordance with roof conditions, but in no case, shall spacing exceed 4 feet lengthwise and crosswise. Where roof bolts are installed at spot locations, roof bolting shall begin under safe roof and continue for the length of the adverse roof condition until safe roof is again encountered.

An approved calibrated torque wrench that will indicate the actual torque on the roof bolts by a direct reading shall be provided on each roof bolting machine in operation.

Immediately after the first bolt is installed in each place, the torque shall be tested and thereafter at least one roof bolt out of every four shall be tested by a qualified person. If any of the bolts tested do not fall within the required range, the remaining perviously installed bolts on this cycle should be tested.

If the majority of the bolts still fall outside the required torque range, necessary adjustments shall be made immediately. If, after these adjustments are made, the required torque ranges are still not obtained, supplementary supports such as different length roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.

When roof bolts (spot bolting) are installed inby the outby corner of the last open crosscut, a sopt-check on torques shall be made during each 24-hour period on at least one out of every ten roof bolts installed in such area. Such torque checks are necessary only on advancing sections in working places producing coal during any portion of the aforementioned 24--hour period.

The results of these test shall be recorded in the onshift examinatic book. The record should show the number of bolts tested and number above and below the required range.

If the results show that the majority of the bolts are not maintaining at least ** 110 foot-pounds of torque or have loaded up to * 75 where they exceed 275 foot--pounds of torque, supplementary support such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.

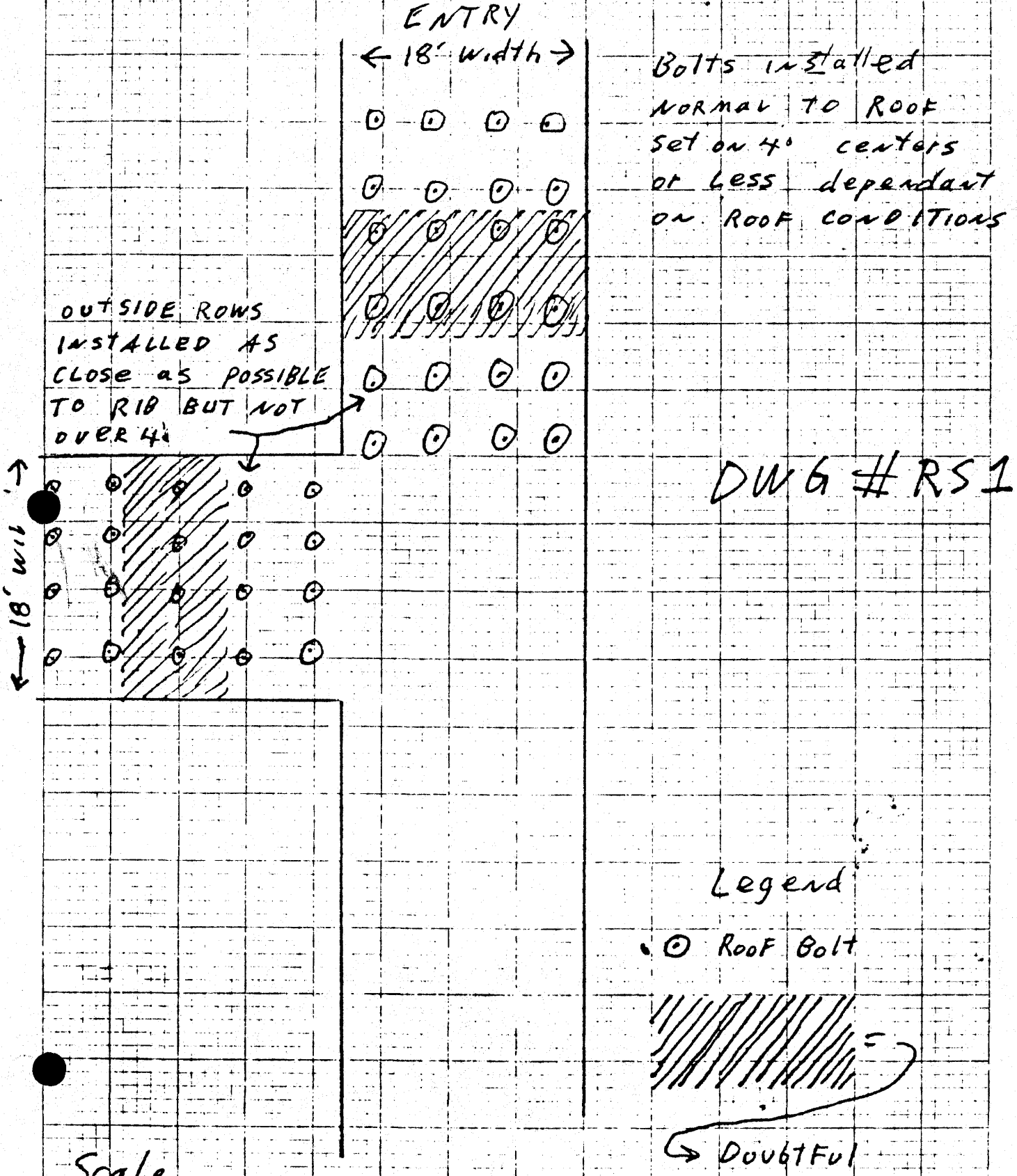
Devices such as spherical washers, angle washers, or slotted wood wedges, shall be used to compensate for the angle when roof bolts are installed at angles greater that 5° from the perpendicular to the roof line.

All roof bolt materials shall be stored and handled in such a manner that will minimize rusting and/or damaging.

At locations where roof bolts are installed (spot bolting), the first roof bolt hole shall be drilled to a depth of at least 12" above the anchorage horizon of the bolts intended for use to determine the nature of the strata. If the area to be bolted exceeds 20 feet, additional test holes shall be drilled at intervals not to exceed 20 feet.

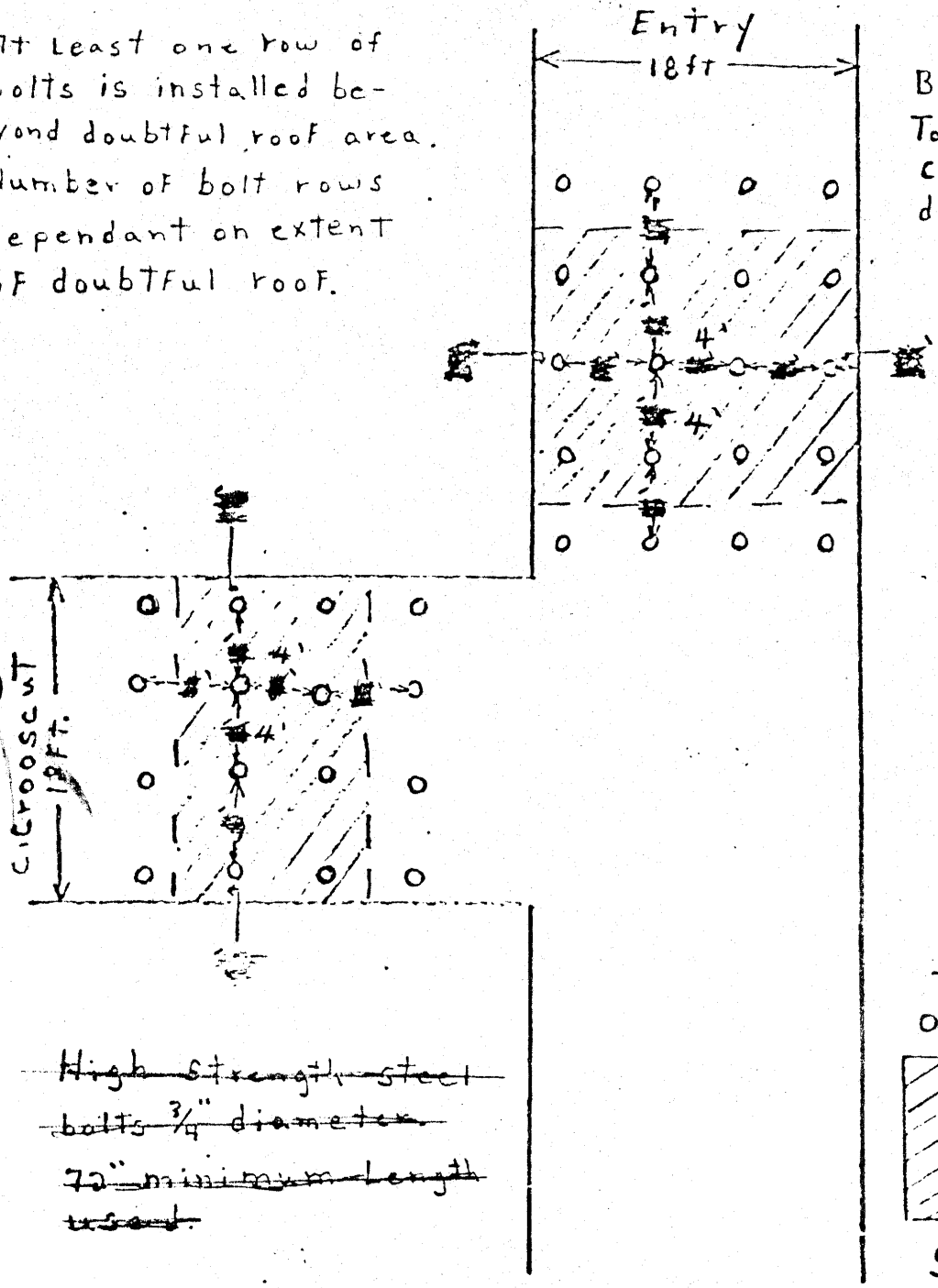
** Plates used directly against roof.
* Plates used against wood.

Spot Bolting Plan in 18' width entry or crosscut where doubtful roof area is encountered across the span.



(a)

At least one row of bolts is installed beyond doubtful roof area. Number of bolt rows dependant on extent of doubtful roof.



Bolts installed Normal To roof. Set on 4' centers or less, dependant on roof conditions.

~~High strength steel bolts 3/4" diameter 72" minimum length used.~~

LEGEND

o = Roof bolt

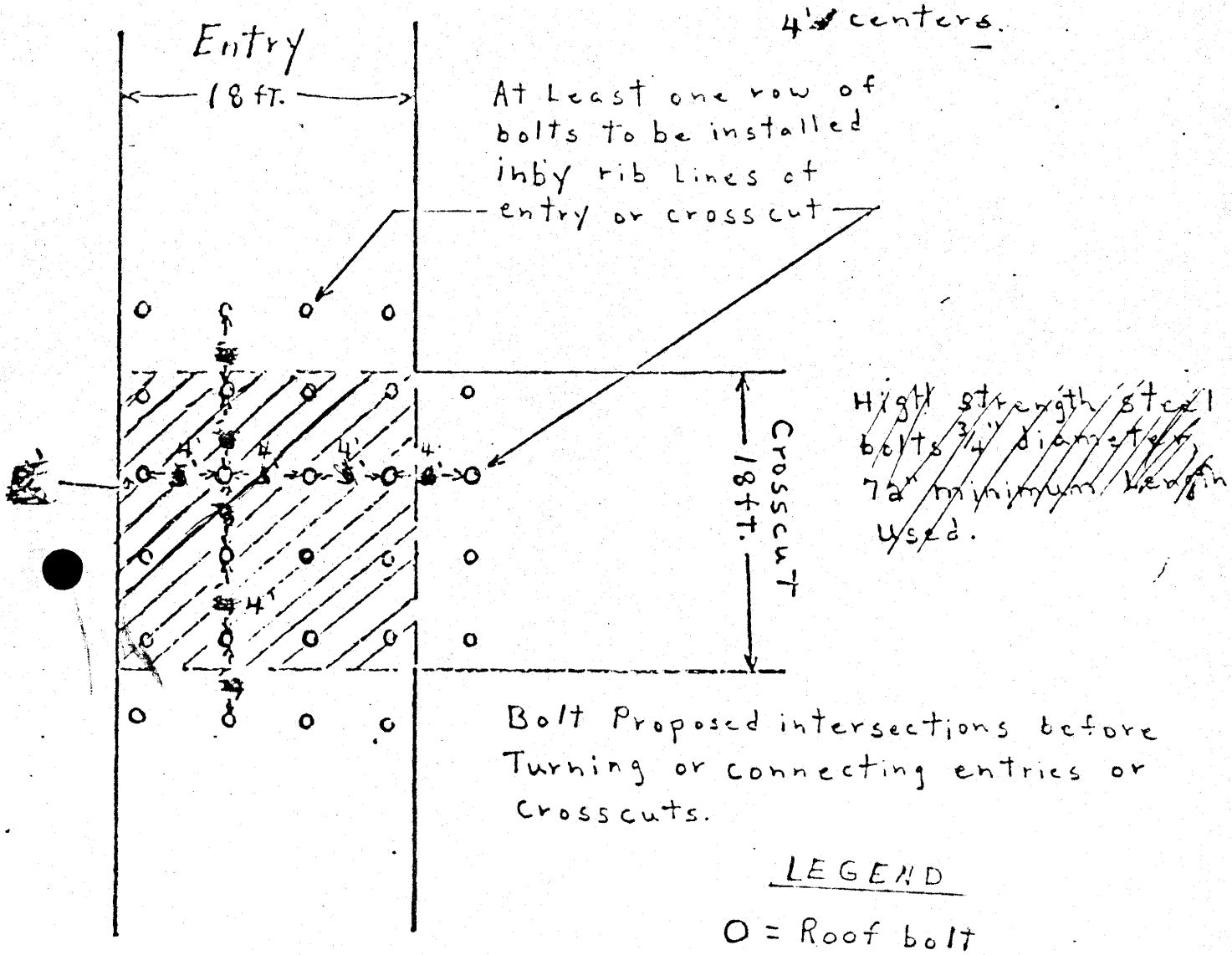
= Doubtful roof area

Scale — 1" = 10'

SPOT-BOLTING PLAN OF 18FT. WIDTH ENTRY OR CROSSCUT WHERE DOUBTFUL ROOF AREA IS ENCOUNTERED ACROSS THE SPAN.

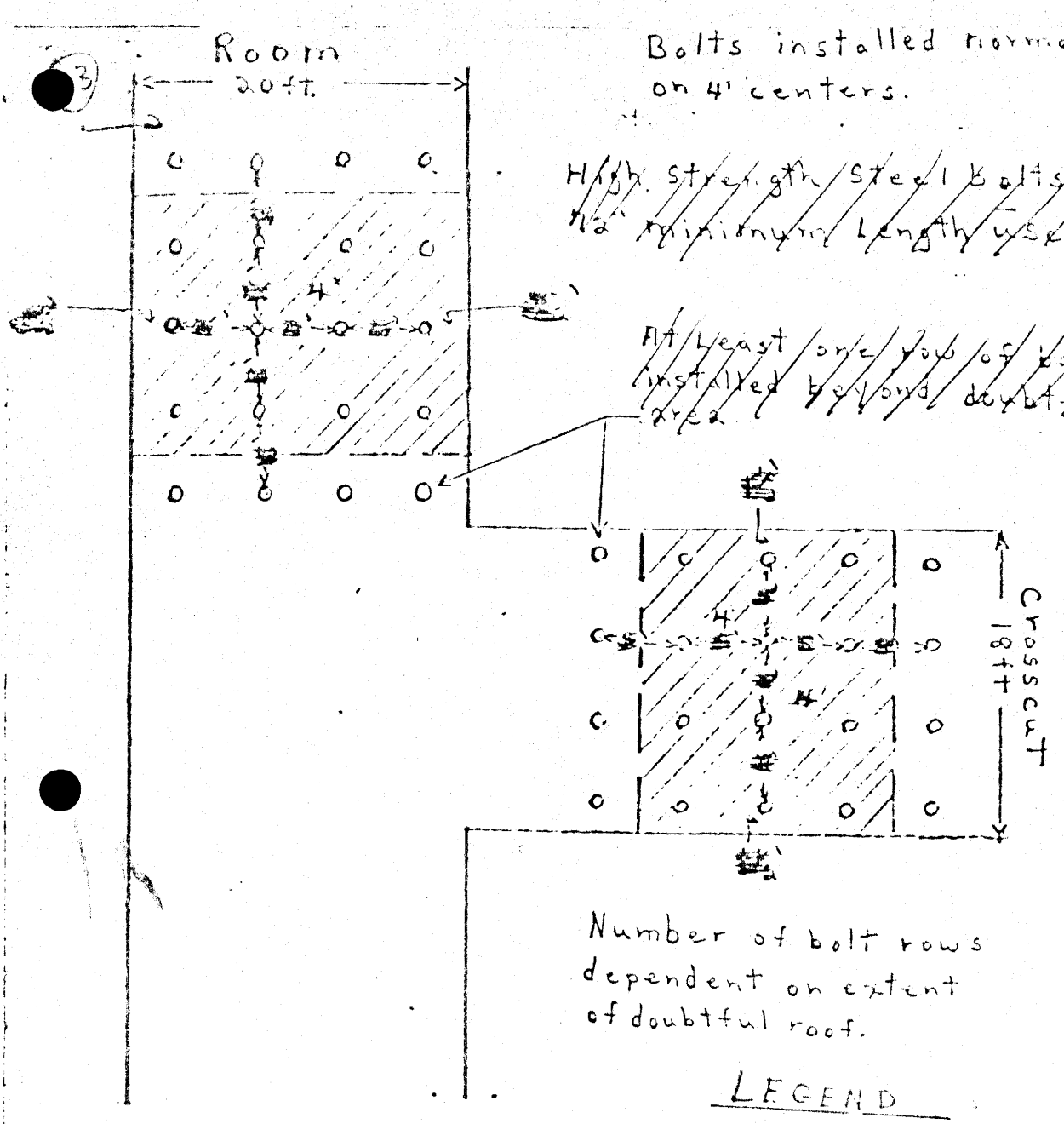
Co-op Mining Company

(12)



Spot-Bolting Plan of Three-Way Intersection of 18' width entry and crosscut when doubtful roof is encountered throughout the intersection

Co-op Mining Company
Huntington, Emery County, Utah



Spot-bolting plan of 20' width room or 18' crosscut where doubtful roof area is encountered across the span.

Co-op Mining Company

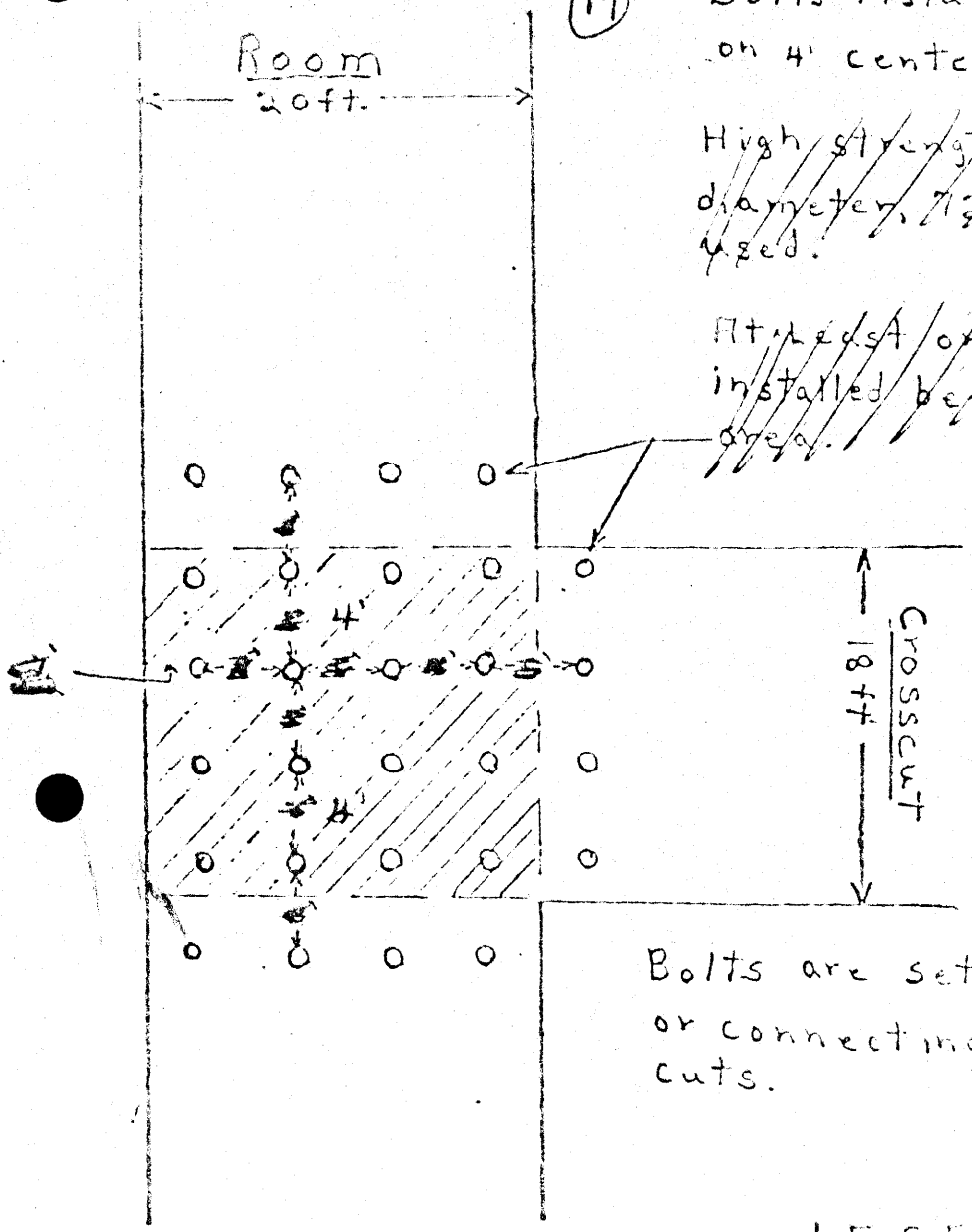
Huntington, Emery County, Utah

(14)

Bolts installed normal to roof on 4' centers.

High strength steel bolts 3/4" diameter, 7½' minimum length used.

At least one row of bolts is installed beyond doubtful roof area.



Bolts are set before turning or connecting rooms or crosscuts.

LEGEND

O = Roof bolt

= Doubtful roof area

Scale - 1" = 10'

Spot-bolting plan of three-way intersection of 20' width room and 18' width crosscut when doubtful roof is encountered through out intersection

Co-op Mining Company

(15)

PART "B"

ROOF SUPPORT WHERE NORMAL MINING IS RETREAT MINING

Plan for pulling pillars

Pillars are about 60 ft. wide and 75 ft. long. Rooms are about 20 ft. wide. crosscuts and entries are 18 ft. wide. Coal seam is about 12 ft. high. Posts used are 7 in. minimum in diameter, topped with a cap piece 4" by 6" by 24" to 30".

A minimum of two rows of breaker posts are installed or not more than 4 ft. centers across each opening leading into pillared areas and these posts are installed before production is started. Such posts are installed near the breakline between the split being started and the gob.

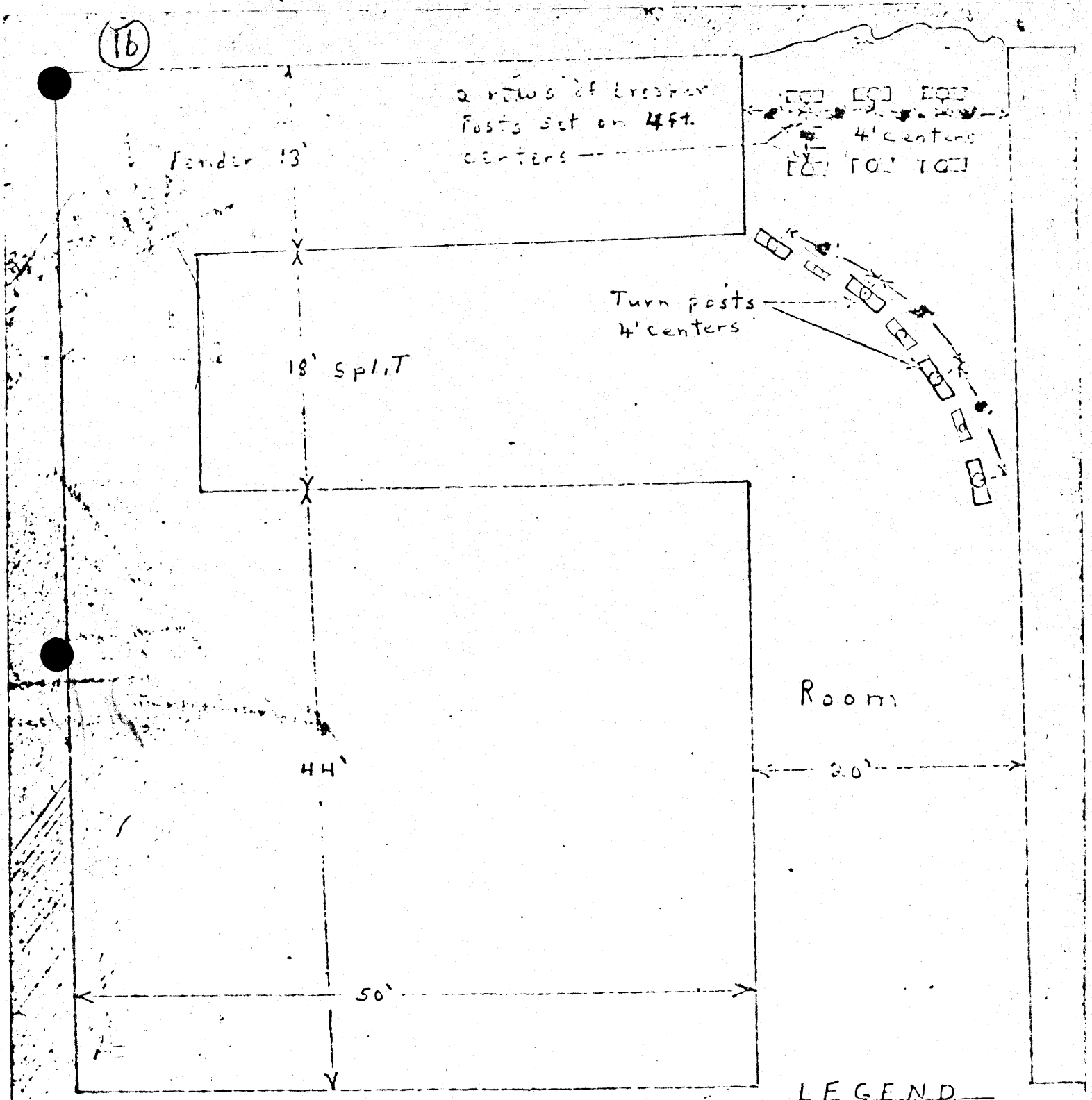
A 13 ft. fender is left between gob and pillar split. The pillar split is about 18 ft. wide. A set of turn posts are set up at the entrance of the split on 4 ft. centers. When this split is through the pillar another set of breaker posts are set up at gob end of the split. Another set of turn posts are set on 4 ft. centers then the fender is slabbed off untill the stumps on each side can be shot out or cut small enough to cave to.

When starting on the remining 44 ft. of pillar this same method is followed. After setting two rows of breaker posts and a row of turn posts a 13 ft. fender is left and an 18 ft. cut is made. This leaves a 13 ft. fender on either side of the pillar split, one on the gob side and one next to an 18 ft. cross cut. When second split is through to gob, two sets of breaker posts and a set of turn posts are set next to the gob line. The two fenders are then split or slabbed off untill the stumps can be shot out or the to can be caved.

Each pillar is started and completed in this manner. This method described is under ideal or good conditions. It should be noted that if additional posts are needed anywhere they are set.

See sketches or pages 2-3-4-5 and 6.

(16)



Starting Pillar Splits

Co-op Mine

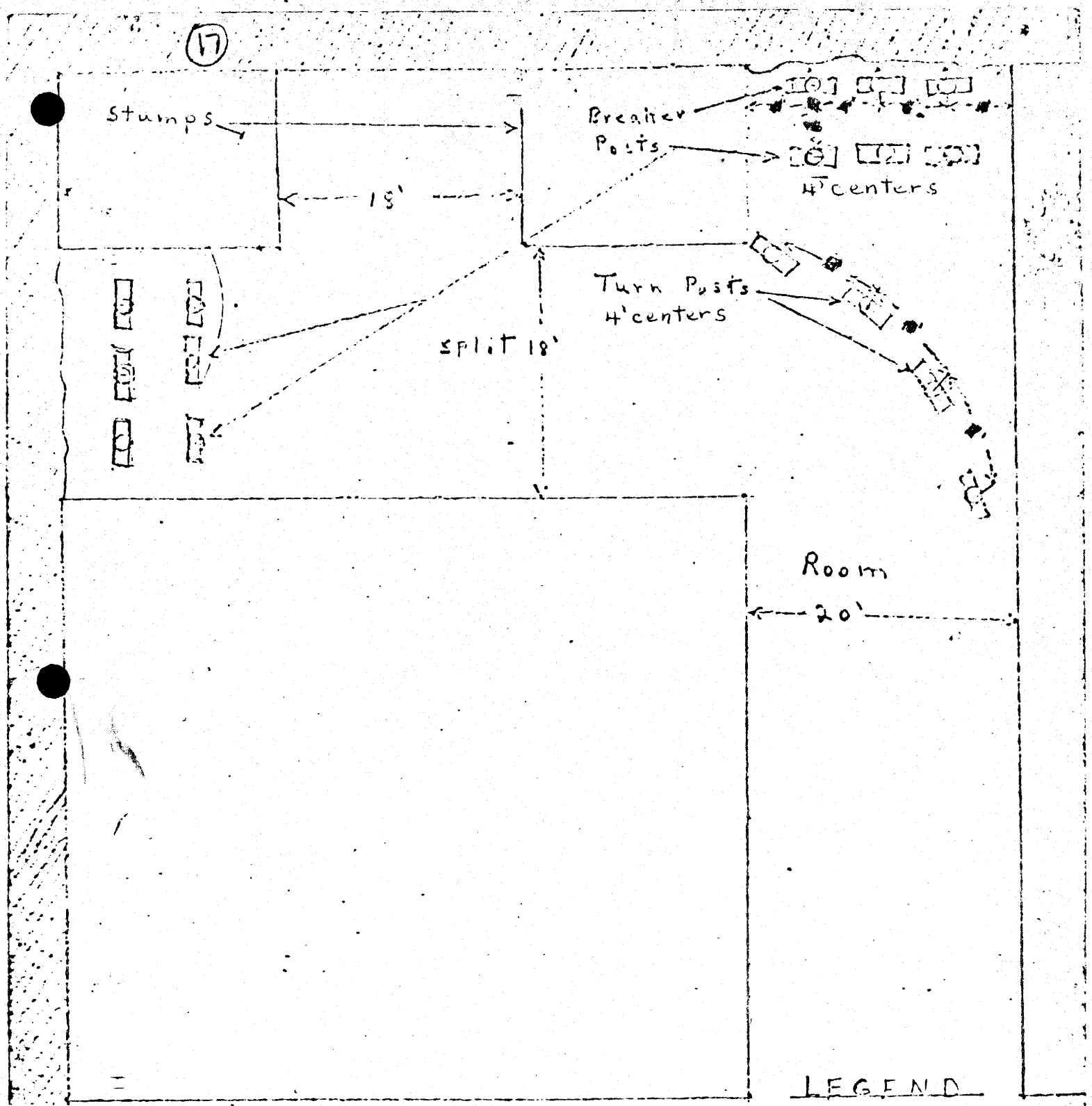
Co-op Mining Company

Huntington, Emery County, Utah

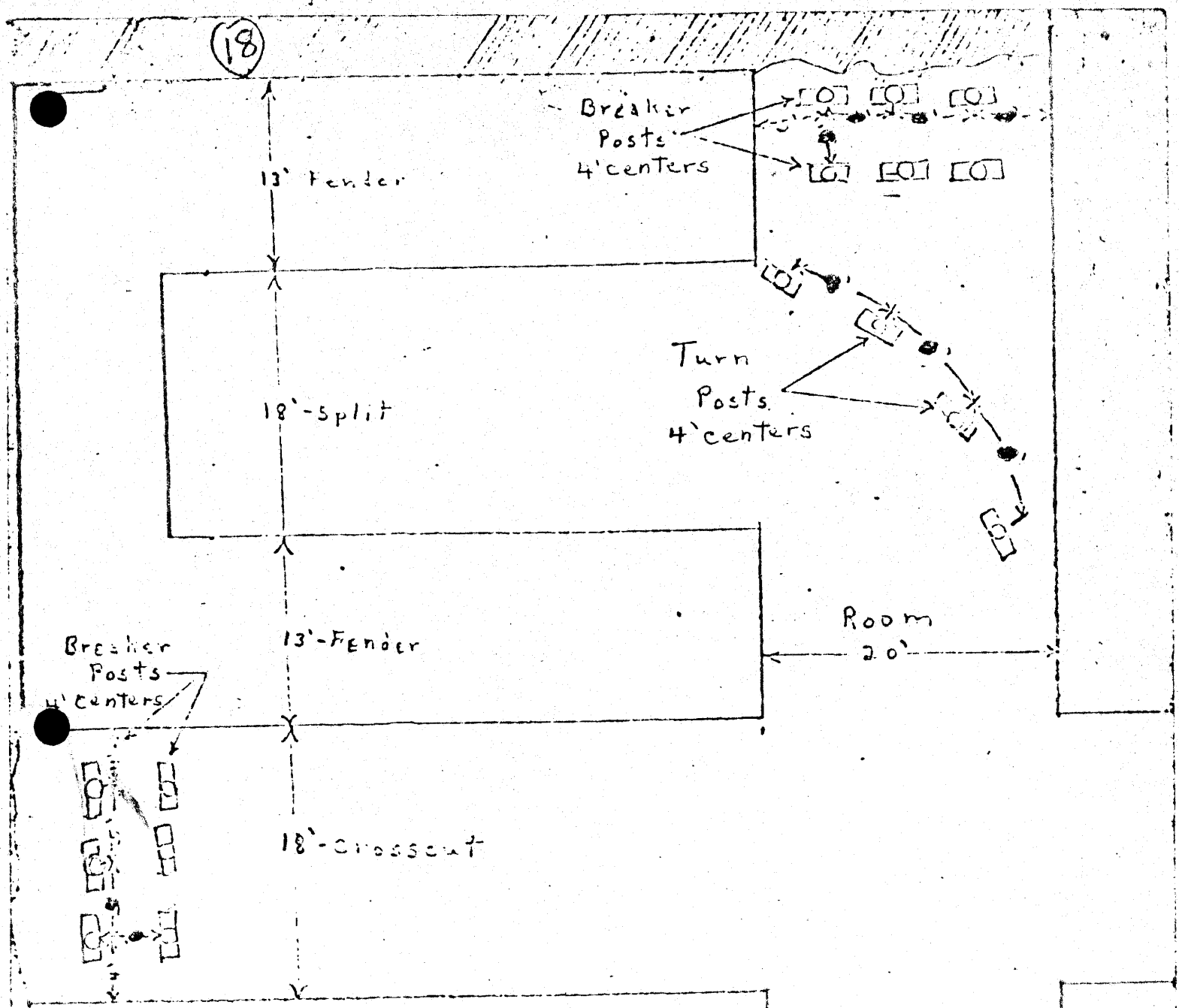
LEGEND

- Timbers + cap p
- Caved Area

Scale - 1" = 10'



Co-op Mine
Co-op Mining Company
Huntington, Emery County, Utah



Making second split in pillar

Co-op Mine
=
Co-op Mining Company
Huntington, Emery County, Utah

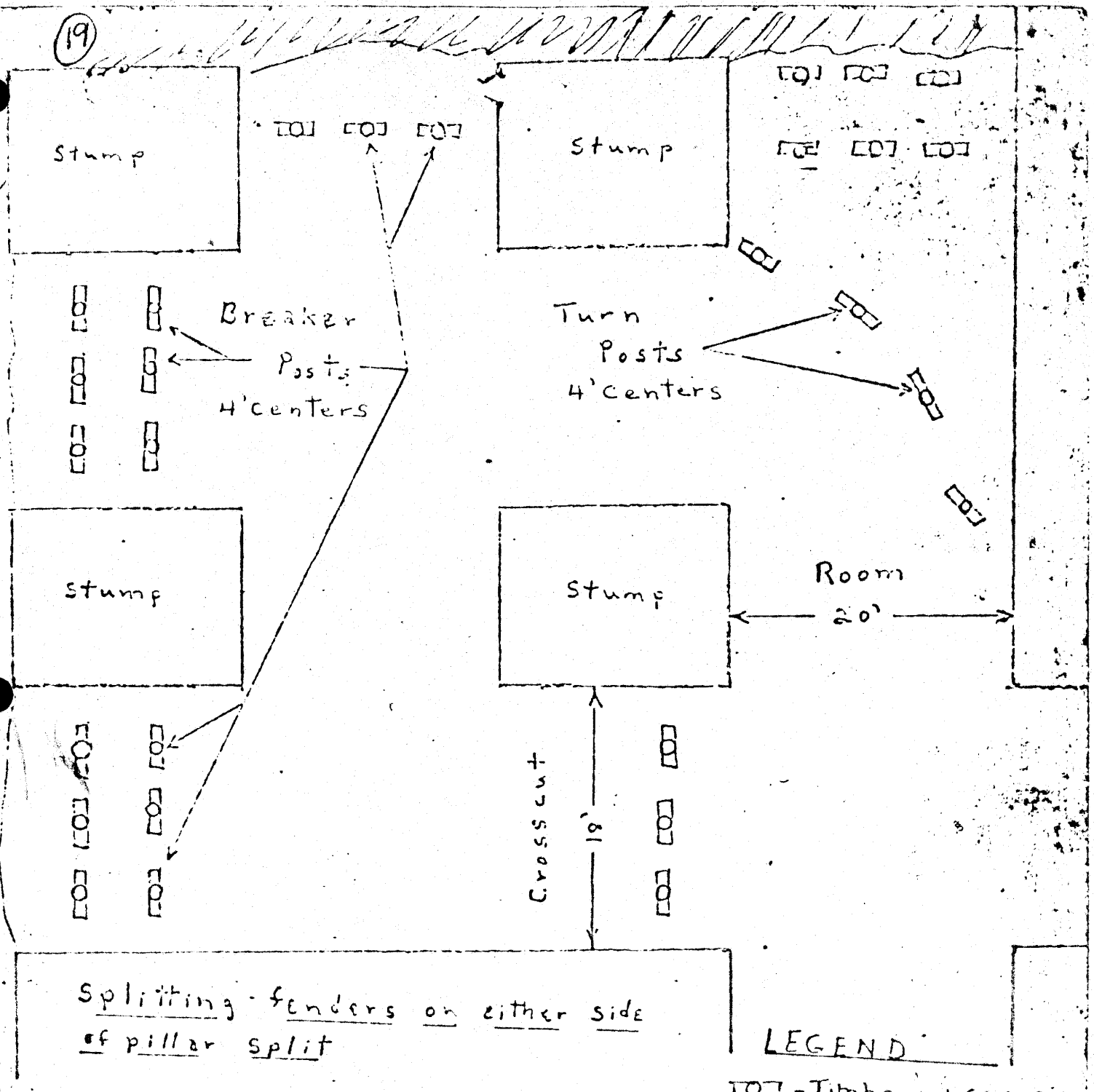
LEGEND

[O] – Timbers & Cap pieces

– Caved Area

Scale – 1" = 10'

(19)



Co-op Mine

Co-op Mining Company

Huntington, Emery County, Utah

Scale - 1" = 10'

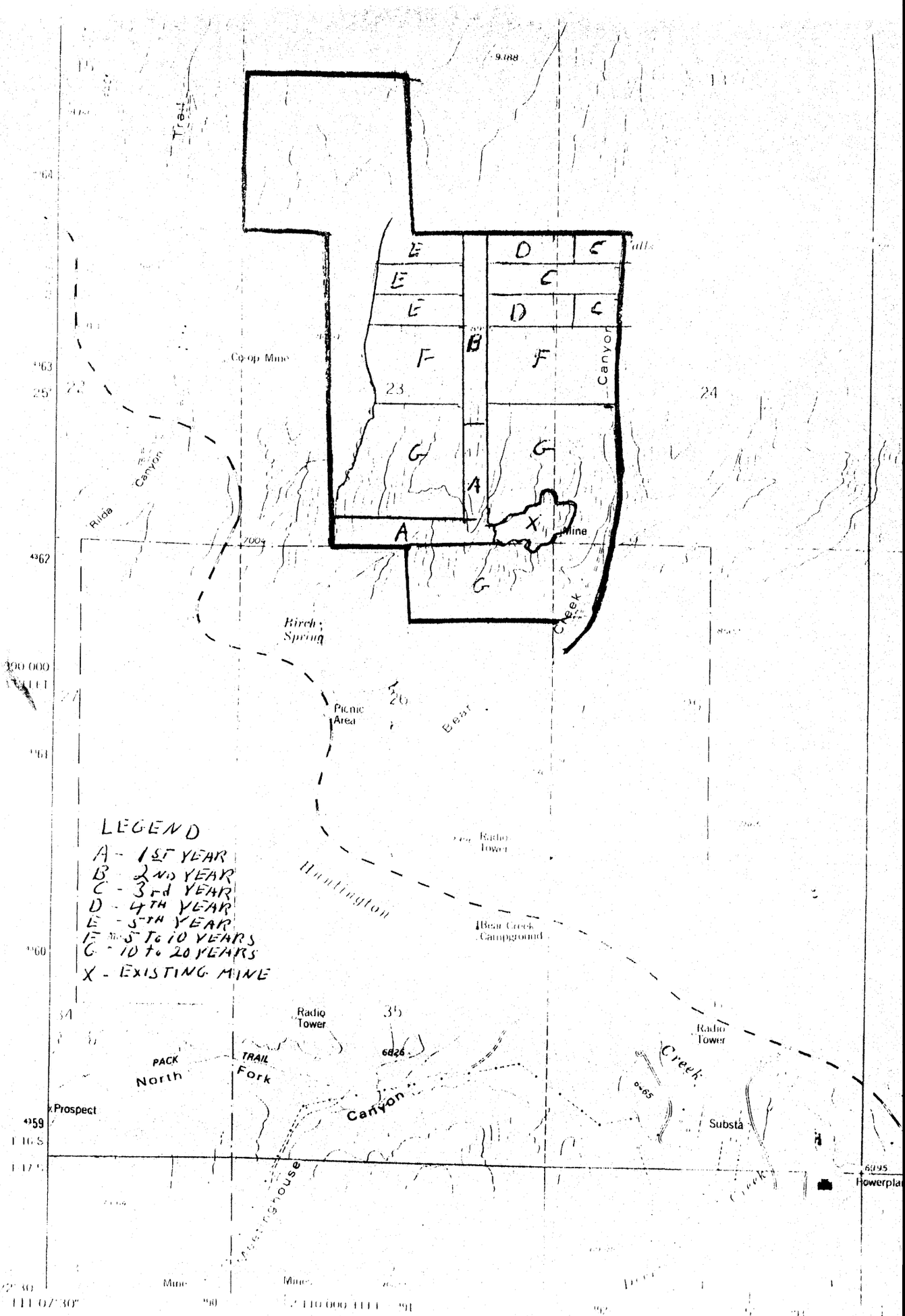
UMC 784.11 Operation Plan

(a) Anticipated annual production;

1st	year	200,000 tons
2nd	"	200,000 "
3rd	"	200,000 "
4th	"	200,000 "
5th	"	300,000 "

Anticipated total production for mine life;

10,704,908 Tons.



Mapped, edited, and published by the Geological Survey

Control by USGS, NOS/NOAA, and U.S. Forest Service

Topography by photogrammetric methods from aerial photographs taken 1970. Field checked 1974. Map edited 1978

Projection and 10,000 foot grid ticks: Utah coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue. 1927 North American datum

Fine red dashed lines indicate selected fence lines

There may be private inholdings within the boundaries of the National or State reservations shown on this map

UTM GRID AND 1978 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE BY U.S.
A FOLDER

Plate III-10-b

CHAPTER III Exibit 'e'

EQUIPMENT LIST

Underground

continuous miner
electric shuttle cars
belt lie with feeder-breaker
roof bolter
scoop
service vehicle
personell carrier
boss buggy
rock dusters
water pumps
supply tractor
stoper
power center

Surface

Vibrating screens
crushers
conveyors
Front end loaders
road grader
crawler tractor
fork lift

3.2 Surface facilities/ Construction Plans

3.2.1 Site has been selected and preparation is nearing completion under permit #ACT/015/025 (See Plate III-1-b, Plate III-2-b, Plate III-3-b, and Plate IV-1).

3.2.2 The mine is an old existing mine that will be reclaimed, but the present portal will be closed, and three new portals, fan, belt, and intake will be developed. (See Plate III-1-b).

3.2.3 Surface structures will consist of; a single building complex containing shops, parts warehouse, bath house, and mine offices; truck scales, weighman office, caretaker dwelling, mine run coal reciever bin, lump coal bin, crushing and sizing structure, truck load out bins, stockpile towers, and conveyors to carry coal to storage and load out sites. (See Plate III-1-b)

3.2.4 Coal carried from the mine by conveyor belt to a reciever bin, conveyed to the sizing and crushing plant, the lump removed and divirted to the lump bin, the rest of the oversize crushed, and the coal sized to meet the various requirements of the different costomers, then conveyed to the truck load out bins, or the stockpile area.

3.2.5 Power will be delivered by U P & L transmission lines at 12,500 V. direct to a substation (See PLate III-1-b), reduced to 4160 V. for the mine feeder line, and to 480 V. for tipple use, and to 240 V. for shop and other use.

3.2.6 Water for bath house and caretaker dwelling will be hauled from spring in Trail Canyon to fresh water storage tanks.

3.2.7 Individual septic tank system.

784.16 Recamation plan; Dams, ponds, impoundments, and embankments.

The following is a general description of the hydrology of the mine plan area, and a reclamation plan for the above named strudtures. Also enclosed are maps and cross sections of the above.

7.2 Surface water hydrology

7.2.0 The intent of this portion is to show the surface water characteristic of the watershed area in general, and of the mine plan area in particular, and the possible effects of the mining operation on the surface runoff. Also measures taken to control and minimize that effect.

7.2.1 Much of the information herein, is data from a report prepared by Mike Thompson, Hydrologist, regarding the surface hydrology of the mine plan area. Also plates to shoe location and specifications of control system and structures.

7.2.2 Existing surface water resources.

7.2.2.1 See Exibit VII-b Regional hydrology

7.2.2.2 The mine plan area is on the Huntington Creek watershed, but Huntington Creek does not pass through the mine plan area. Runoff from rainfall and snow melt pass through the area into Huntington Creek. There are a few seeps or small springs coming from the ledges at higher elevations that contribute water to Bear Creek during the early part of the season, or later during years of above normal precipitation, but flow is seldom observed in the winter months. (Also see Exibit VII-c).

7.2.3 Surface water development, control and diversions.

7.2.3.1 Water supply; none

7.2.3.2 Sedimentation control structures and diversions; See Exibit VII-e, and also Plate III-2-b

7.2.4 Effects of mining on surface water.

7.2.4.1 Effect on hydrological balance will be minimal because of the small amount of disturbed area.

7.2.5 Control plans include a sedimentation pond with drainage and diversion structures, and a monthly monitoring of water leaving the disturbed area.

7.2.6 Water samples will be collected one time each month (no less than 25 days apart) at the point where it leaves the mine plan area, and at a point immediatly above the disturbed area if there is any water there. Flow will be recorded, and samples will be analyzed for content of iron, manganese, and suspended solids, and for acidity (ph).

Ex VII 0

page 1

HORROCKS ENGINEERS
One West Main
P.O. Box 377
American Fork, Utah 84003
Telephone (801) 756-7628

Project Name Hidden Valley Date 2/18/80
Project No. 74 ~~Prospect~~ STA No. 139+00 Sample No. 80-30
Test For Soil Class +T-99

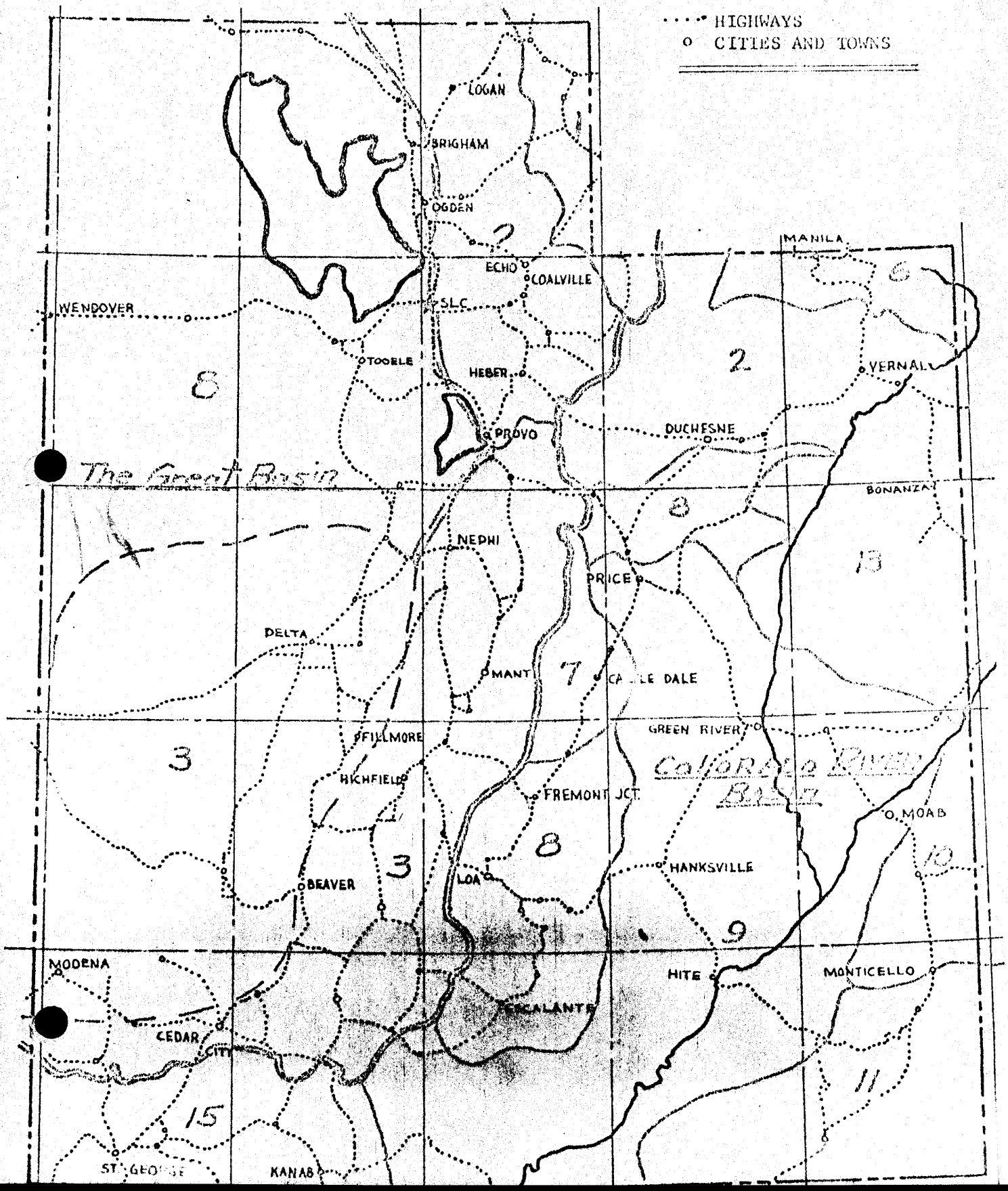
AS RECEIVED GRADATION					
Screen Size	Weight (a)	Percent Retained	Percent Passing		SPECS.
3"					
1½"					
1"					
¾"					
½"					
⅜"					
#4					
Wet Wt. -#4					
Dry Wt. -#4					
Total Wt. Dry					

WASHED GRADATION AFTER CRUSHING (2500 Gm. Dry Recombined Sample)					
Screen Size	Weight Retained	Percent Retained	Percent Passing	Total % Passing	
1"					
¾"					
½"					
⅜"					
#4	18.4	3.7		96.3	
~~#8~~ #10	12.4	2.5		93.8	
~~#16~~					
#40 ~~#50~~	77.0	15.6		78.2	
#200	253.4	51.3		26.9	
-#200	4.1	0.8			

3991
516.6
494.0

L.L.	N/P	A.A.S.H.O. Class
P.L.	N/P	A-
P.I.	N/P	

Chart 2-12: HYDROLOGIC AREAS



3

Chart 2-11: FLOOD REGIONS

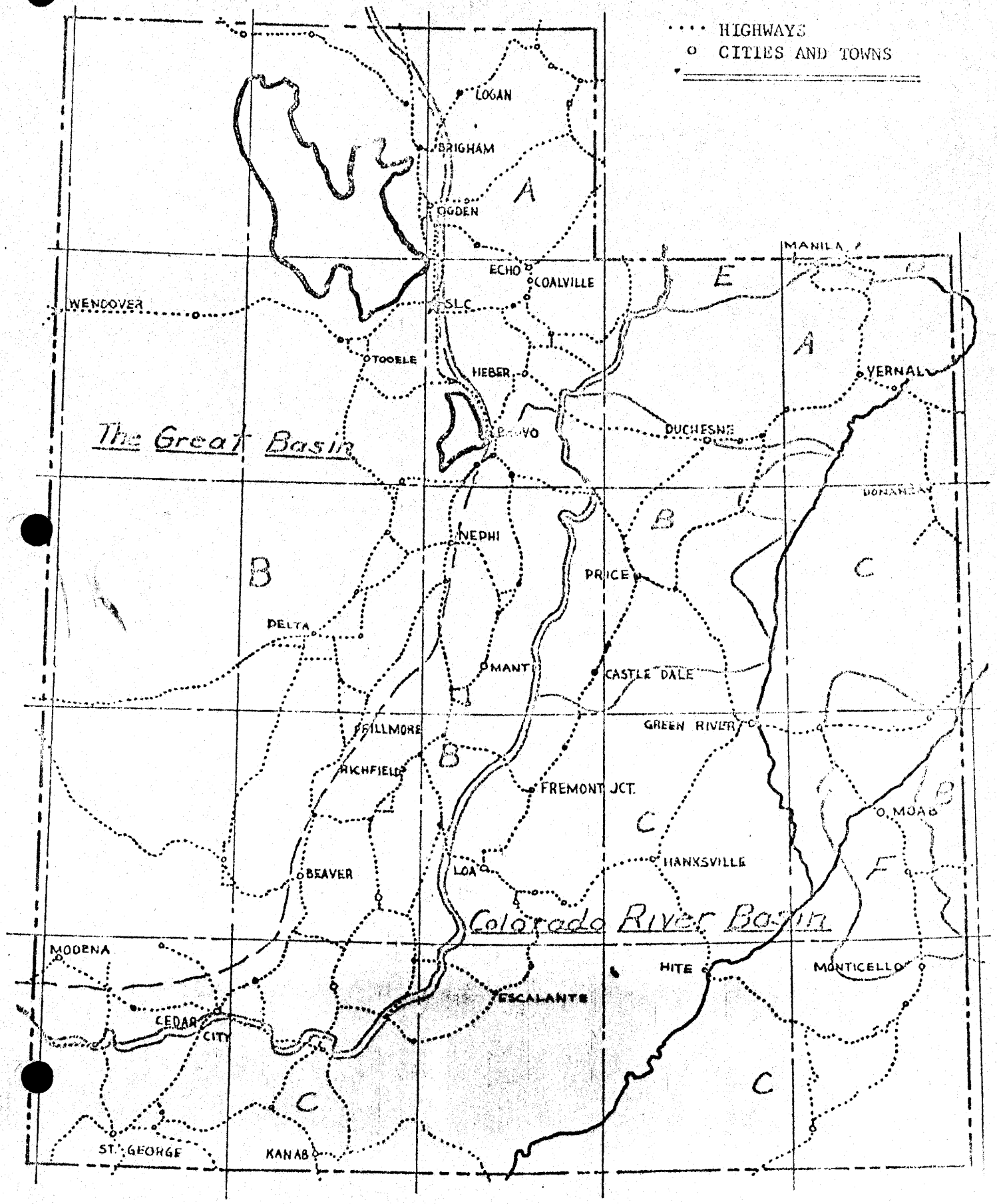


CHART 2-22A: COMPOSITE FLOOD FREQUENCY CURVE FOR REGIONS A, B, & E
(COLORADO RIVER BASIN)

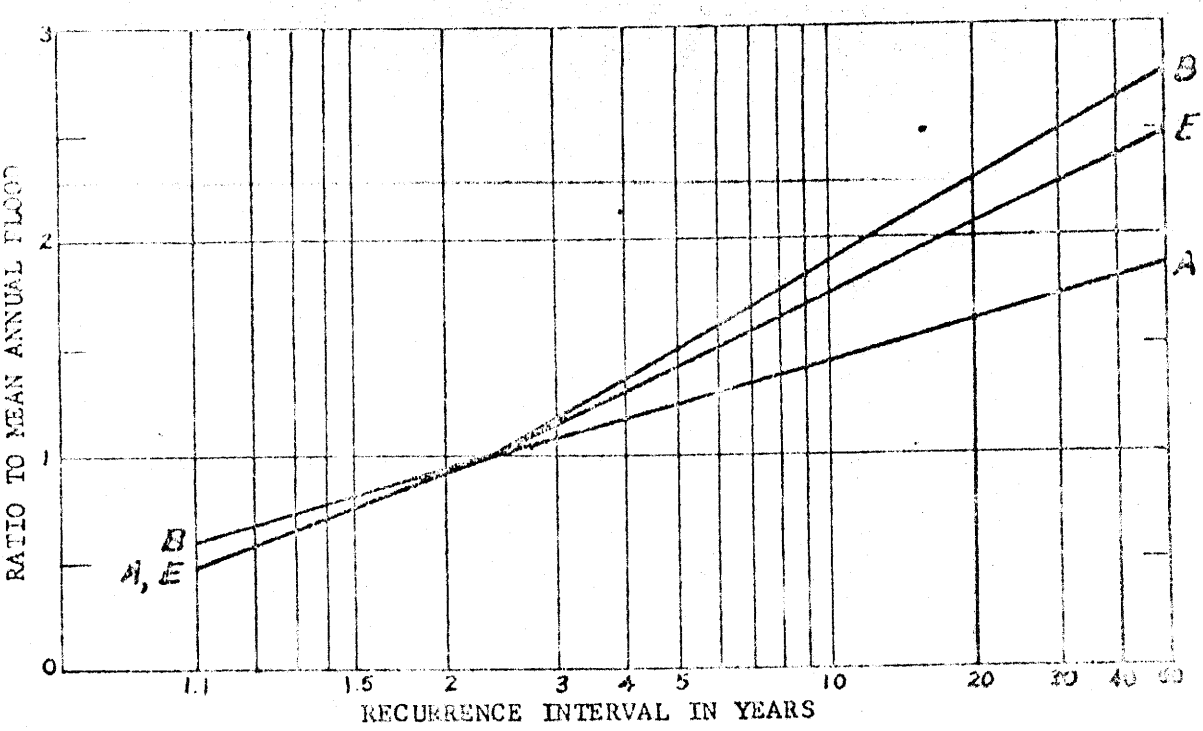
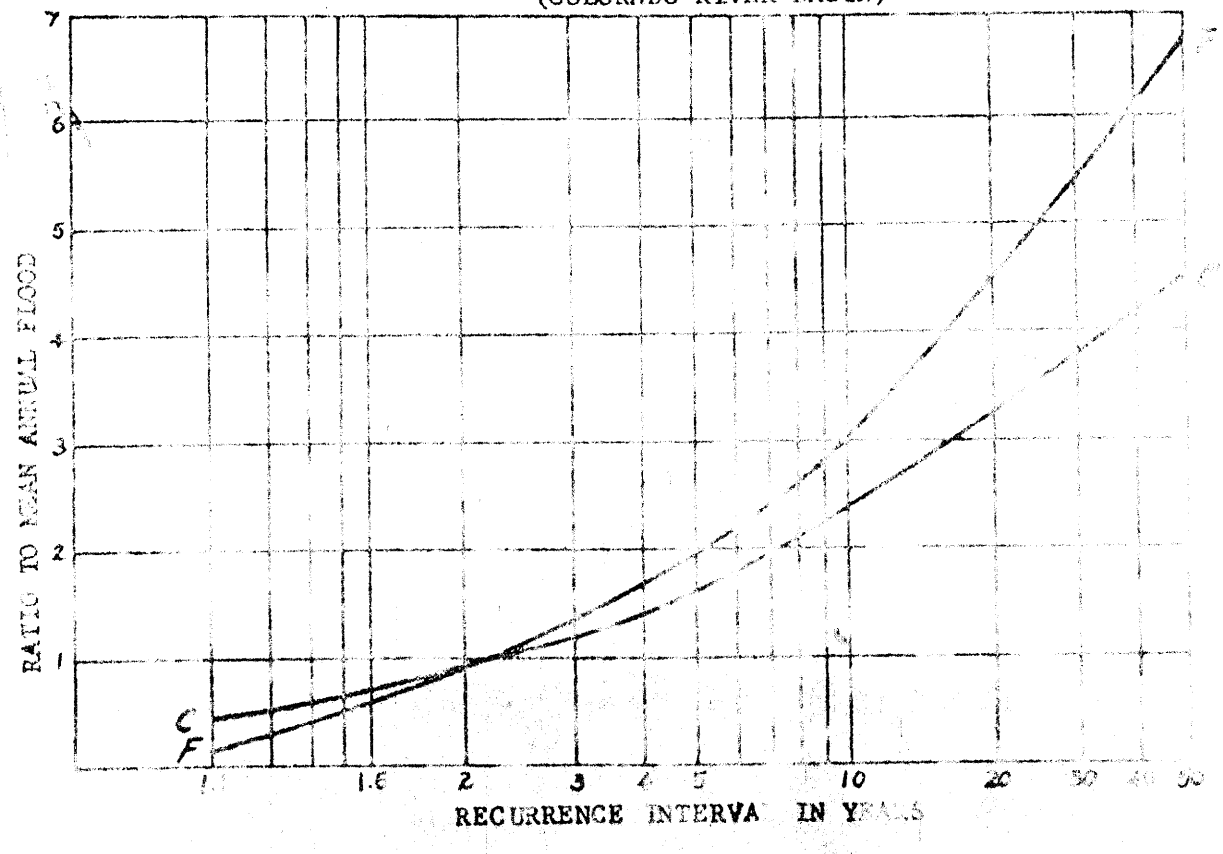


CHART 2-22B: COMPOSITE FLOOD FREQUENCY CURVES FOR REGIONS C & F
(COLORADO RIVER BASIN)



ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION
(inches)

Station: Clear Creek Summit
Latitude: 39° 39'

Elevation: 9630
Longitude: 111° 12'

DURATION

RETURN PERIOD (years)	5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.10	.16	.20	.28	.35	.46	.57	.84	1.08	1.33
2	.12	.19	.25	.34	.43	.57	.70	1.04	1.34	1.65
5	.16	.24	.31	.43	.54	.72	.90	1.34	1.73	2.14
10	.19	.29	.37	.51	.65	.86	1.06	1.55	1.99	2.45
25	.24	.38	.48	.66	.84	1.08	1.31	1.88	2.39	2.92
50	.25	.38	.48	.67	.85	1.13	1.40	2.07	2.67	3.29
100	.27	.42	.53	.73	.93	1.24	1.54	2.29	2.96	3.65

ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION
(inches)

Station: Hiawatha
Latitude: 39° 29'

Elevation: 7230
Longitude: 111° 01'

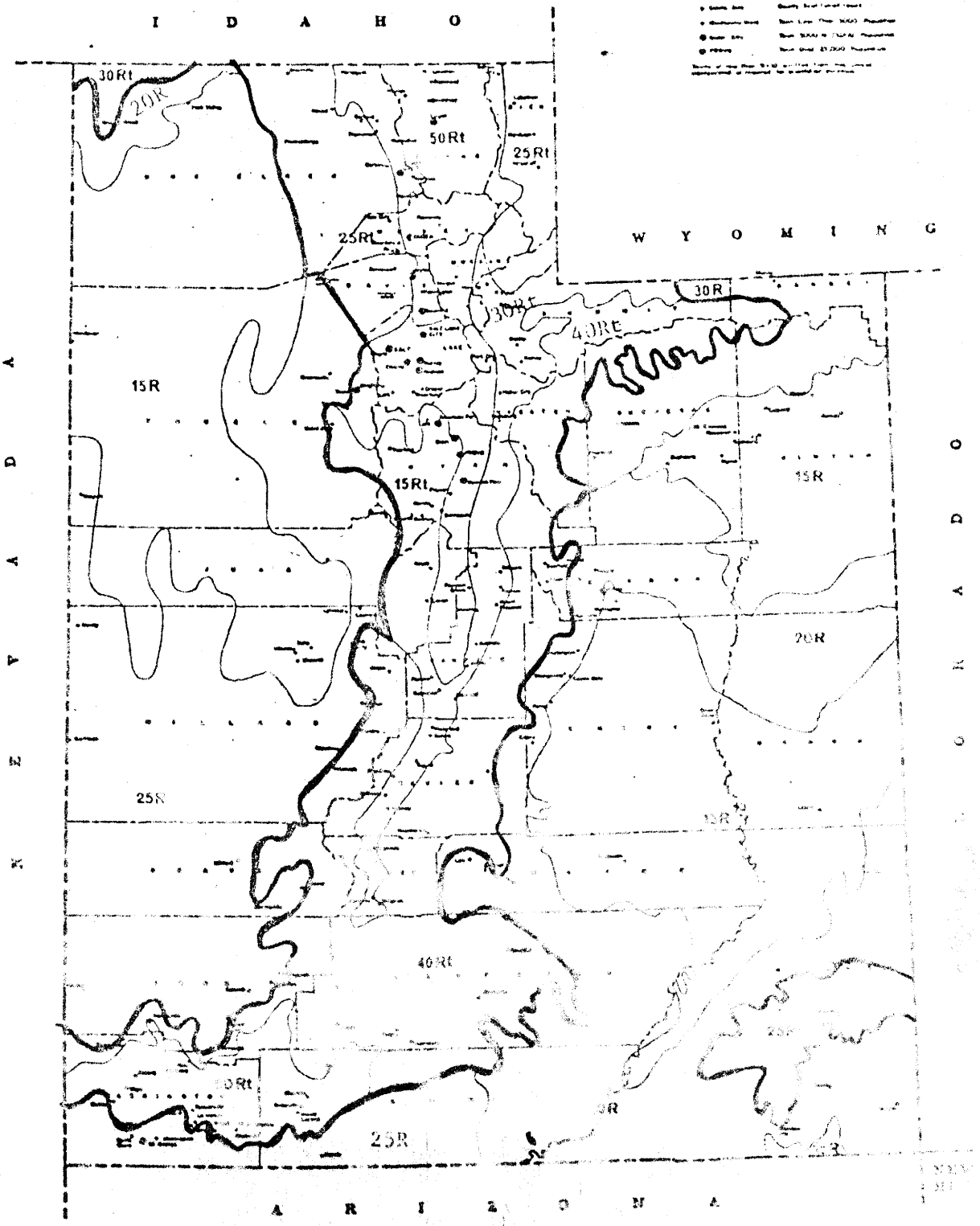
DURATION

RETURN PERIOD (years)	5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.03	.04	.05	.07	.09	.24	.39	.76	1.09	1.43
2	.07	.10	.13	.18	.23	.40	.55	.95	1.30	1.67
5	.13	.20	.25	.35	.44	.62	.79	1.22	1.60	2.00
10	.16	.25	.31	.43	.55	.75	.93	1.40	1.82	2.25
25	.23	.35	.44	.62	.78	.99	1.19	1.69	2.14	2.60
50	.26	.40	.50	.70	.88	1.11	1.33	1.89	2.38	2.90
100	.31	.48	.60	.84	1.06	1.30	1.54	2.12	2.64	3.18

FIGURE 1

UNIVERSAL SOIL LOSS EQUATION

AVERAGE ANNUAL VALUES FACTOR R and Rt



R - Rainfall Only
Rt - Rainfall and Snowmelt

U.S. Department of Agriculture

Exibit VII d

Ford Chemical LABORATORY, INC.

Bacteriological and Chemical Analysis

40 WEST LOUIGE AVENUE
SALT LAKE CITY, UTAH 84115
PHONE 485-5761

Date: December 5, 1978

Name Co-op Mining Company

Address 53 West Angelo Avenue

Salt Lake City, Utah 84115

CERTIFICATE OF ANALYSIS

78-1945

Underground water received November 16, 1978.

Analysis started on: November 16, 1978

Turbidity	1.50 NTU	Total Hardness as $CaCO_3$	382.0 mg/l
Conductivity	650.0 umhos/cm	Iron as Fe (Total)	0.078 mg/l
pH	7.85 Units	Iron as Fe (Filtered)	0.067 mg/l
Total Dissolved Solids at 180°C.	416.0 mg/l	Lead as Pb	<0.001 mg/l
Alkalinity as $CaCO_3$	346.0 mg/l	Magnesium as Mg	37.44 mg/l
Arsenic as As	<0.001 mg/l	Manganese as Mn	0.003 mg/l
Bicarbonate as HCO_3	422.12 mg/l	Mercury as Hg	<0.0002 mg/l
Barium as Ba	0.05 mg/l	Nickel as Ni	<0.001 mg/l
Boron as B	0.130 mg/l	Nitrate as NO_3-N	<0.02 mg/l
Cadmium as Cd	<0.001 mg/l	Nitrite as NO_2-N	<0.01 mg/l
Calcium as Ca	90.4 mg/l	Potassium as K	2.485 mg/l
Carbonate as CO_3	<0.01 mg/l	Selenium as Se	<0.001 mg/l
Chloride as Cl	4.0 mg/l	Silica as SiO_2	7.00 mg/l
Chromium as Cr (Total)	<0.001 mg/l	Silver as Ag	<0.001 mg/l
Chromium as Cr (Hex)	<0.001 mg/l	Sulfate as SO_4	69.0 mg/l
Copper as Cu	0.006 mg/l	Sodium as Na	15.12 mg/l
Surfactants MBAS	<0.05 mg/l	Zinc as Zn	0.049 mg/l
Fluoride as F	0.09 mg/l		

Ford Chemical Laboratory, Inc.

CULVERT ADEQUACY - BEAR CREEK MINE

* *

A. Stream Crossing

Given: Area = 2.65 mi^2
Curve Number estimate = 75

Find: Peak Flow 10 year-24 hour storm
Peak Flow 10 year- 6 hour storm

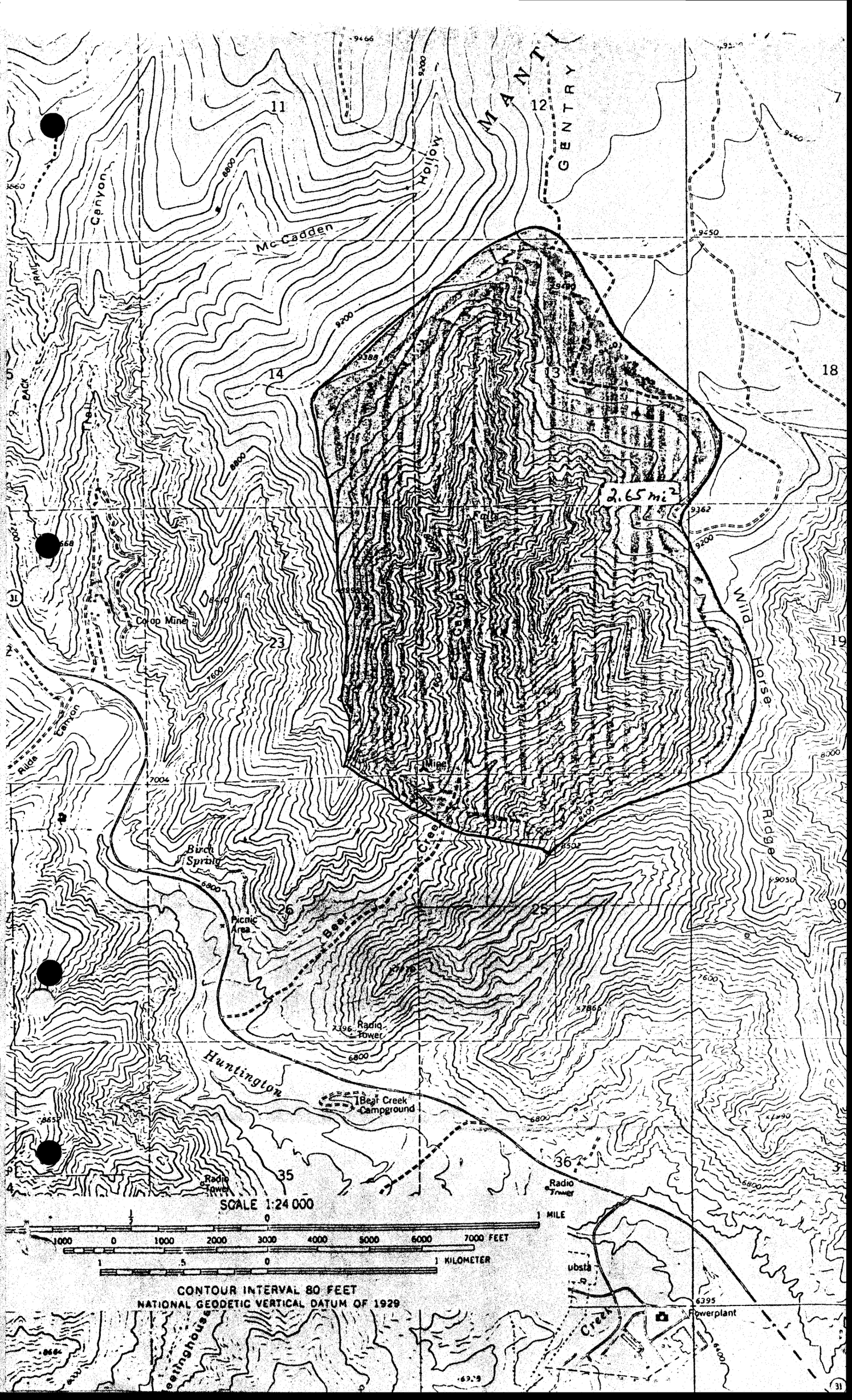
Solution:
Time of Concentration - Kent's Formula
Te = 0.405 hours
Peak Flow
10 year- 6 hour storm = 129 cfs.
10 year-24 hour storm = 87 cfs.

B. Wash adjacent to sediment pond

Given: Area = 0.06 mi^2
Curve Number estimate = 75

Find: Peak Flow 10 year-24 hour storm
Peak Flow 10 year- 6 hour storm

Solution:
Time of concentration - Kent's Formula
Te = 0.178 hours
Peak Flow
10 year- 6 hour storm = 3 cfs.
10 year-24 hour storm = 2 cfs.


MANTI
GENTRY
Hollow
Canyon
McCadden
TRAIL
BACK
Coop Mine
Ruda Canyon
Birch Spring
Picnic Area
Bear Creek
Huntington
Bear Creek Campground
Radio Tower
Radio Tower
Radio Tower
Mine
Falls
Wild Horse Ridge
Powerplant
2.65 mi²
SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETER
CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

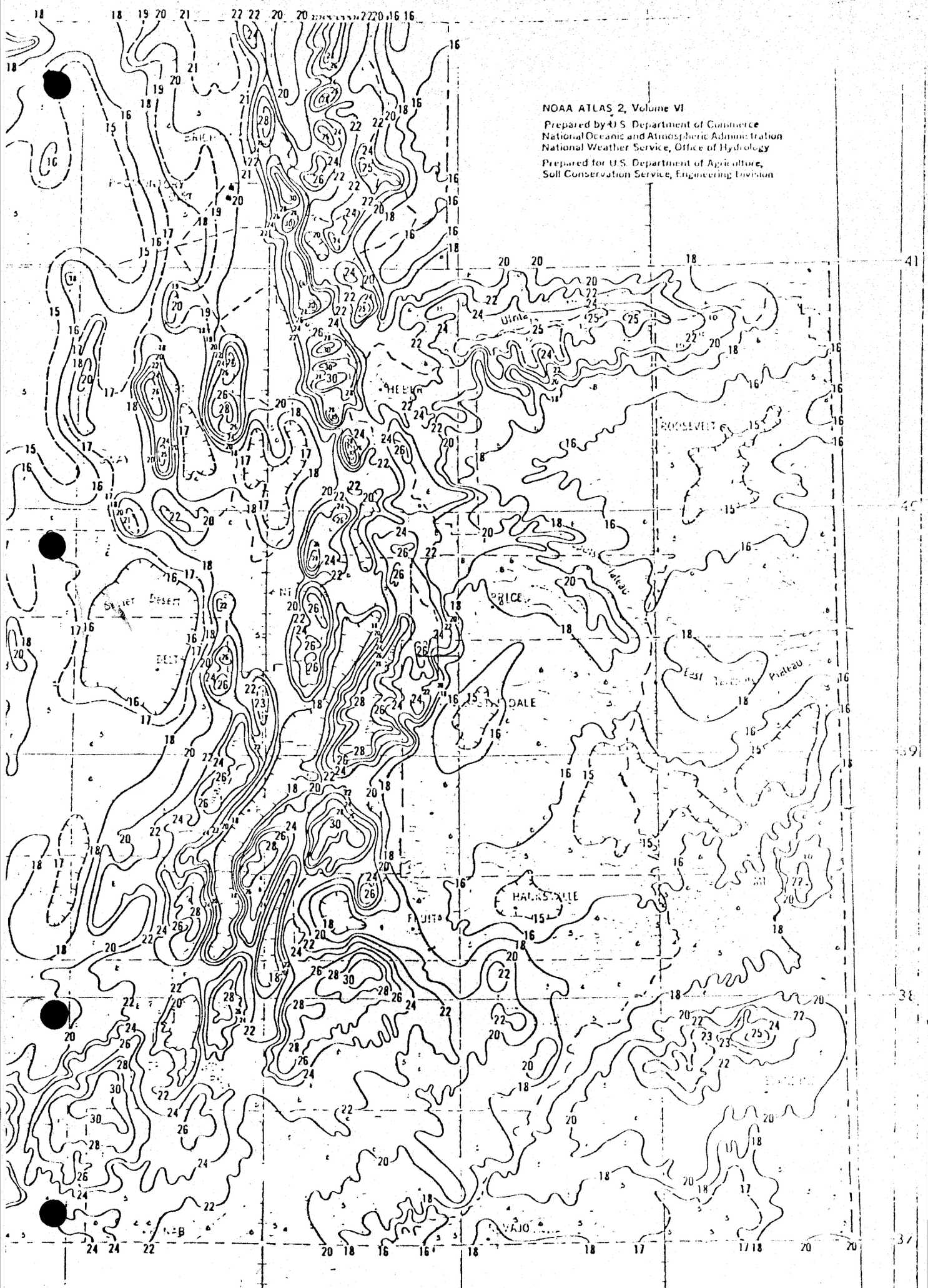


Figure 27

ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH

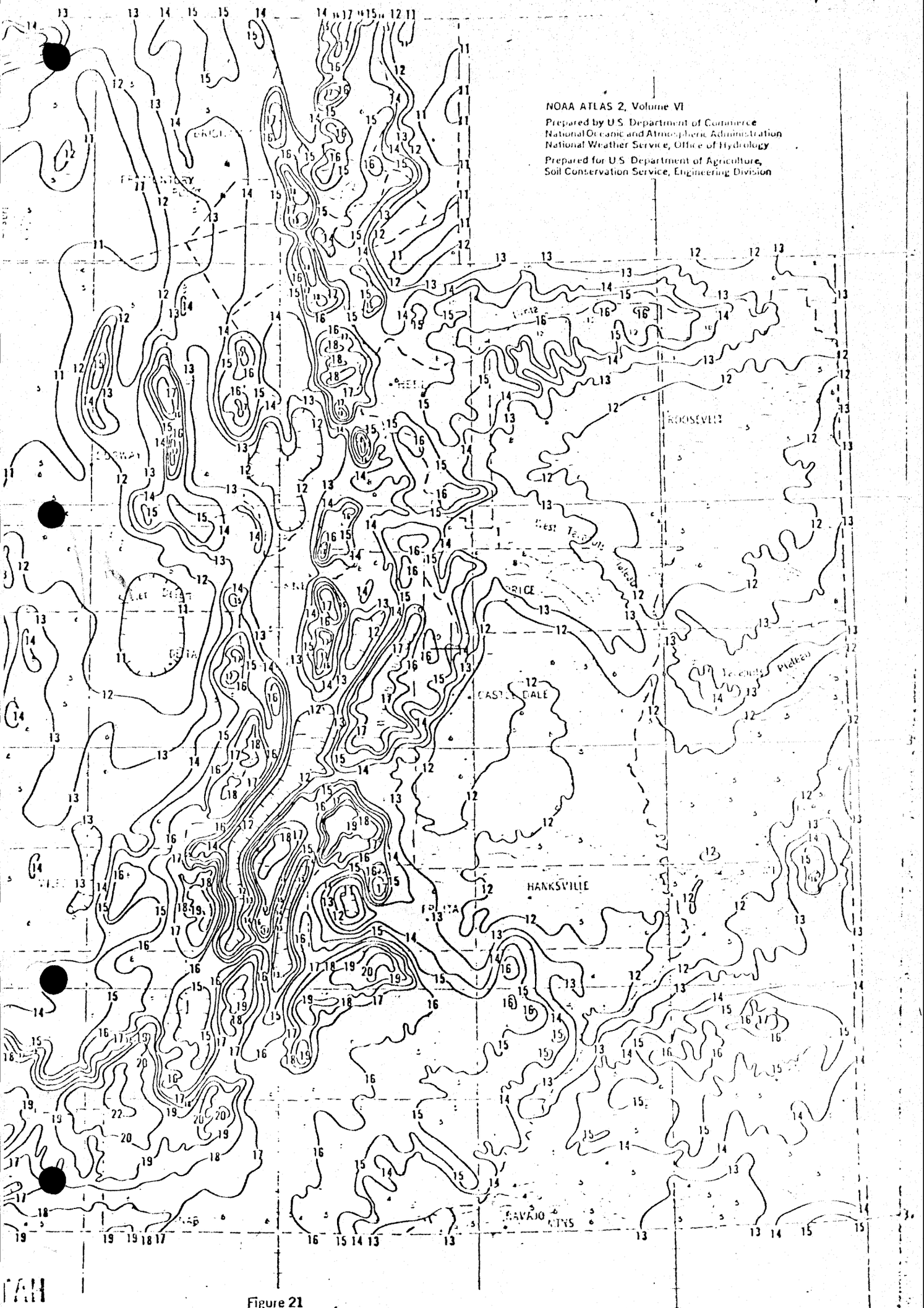
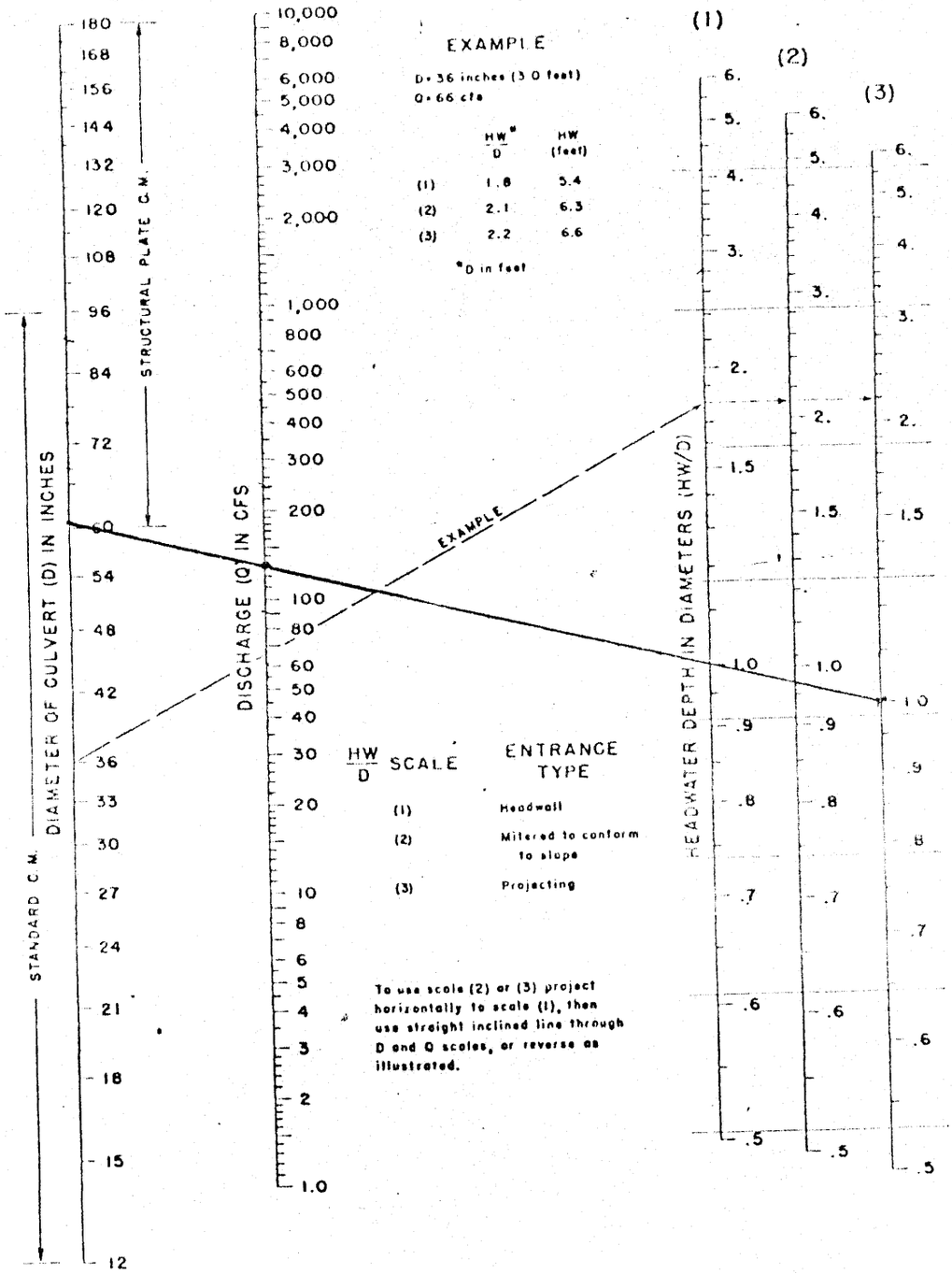


Figure 21

ISOPLUVIALS OF 10-YR 6-HR PRECIPITATION IN TENTHS OF AN INCH

If multiple culvert desired, divide Q(cfs) equally between desired # of pipes to determine culvert diameter

Chart 2-53: HEADWATER DEPTH FOR C.M.P. CULVERTS WITH INLET CONTROL



BUREAU OF PUBLIC ROADS JAN. 1963

Culvert adequacy - Stream Crossing

Design Peak Flow = 130 cfs

Design for headwater no higher than culvert

HW/D = 1

Assume - Culvert is not mitered to slope of embankment

Culvert diameter required = 60 inches

3.5 Reclamation Plan

3.5.1 Contemporaneous reclamation will consist of reseeding ditch banks, pond banks and other areas that have been disturbed during construction of sediment and surface water control structures. Also, reclaiming, contouring, and reseeding of areas previously disturbed that are no longer in use.

3.5.2 If a new area is to be disturbed, the surface material will first be removed and placed in stockpiles. Berms will be constructed around the bottom of the stockpile to catch any dirt that might be washed of from the pile, the pile will be reseeded to provide temporary vegitative cover to help prevent wind and water erosion. A sign will be placed on the pile to identify it.

3.5.3 Final abandonment

3.5.3.1 Upon completion of mining operation, the portal(s) shall be permanently sealed to prevent entry. Permanent seals will be designed to withstand any anticipated water pressure that may develop. (Plate III-5)

3.5.3.2 All machinery, equipment, and structures shall be removed from the permit area in not more than six months from the date of the completion of mining operations. (784.13 (b) (1)

3.5.3.3 Dams, ponds, and diversions will be regraded to the approximate original contour of the land; except if that diversion is a barrow pit adjacent to, or a part of a road or pack trail that is to be left as a permanent road or trail.

3.5.4 Backfilling and grading

3.5.4.1 Disturbed areas will be backfilled and graded in not more than six months from the date of completion of the removal of surface structures, snow depth and weather permitting, or six months from the date the work can begin.
Backfilled material shall be pleced to minimize adverse effects on ground water, minimize off-site effects, and to support the postmining use.

3.5.4.2 Highwalls will be removed or reduced except where the highwall is permanently stable and/or said removal will endanger the life of the machine operator attempting the removal.

Backfilled areas shall be restored to a contour that is compatible with the natural surroundings and is capable of supporting the post mining land use. Where practicable and appropriate, such contour shall the approximate original contour.

3.5.4.3 Cut and fill terraces will be used where required in order to conserve soil moisture, ensure stability, and control erosion on final graded slopes. Terraces will meet the requirements of UMC 817.101 (4) (i) thruogh (iv).

3.5.4.4 Redistribution of soil will include covering all debris, coal or other materials constituting a fire hazard, in a place and manner designed to prevent contamination of ground or surface water. Soil will be compacted or otherwis stabilized in preparation for reseeding.

3.5.5 Revegitation.

3.5.5.1 The soil that has been redistributed and compacted will be covered with the surface material from the stockpiles, or other soil that has been tested and found to be suitable and able to support vegitative cover. Soil will be prepared for seeding by harrowing or final grading.

3.5.5.2 Seeding and/or transplanting will be done during the season most favorable for planting, as determined from information supplied by area experiment stations, or by previous seeding experiences at the mine site. Seeding will be done by broadcasting with cyclone type seeders, followed by harrowing. (See exibit 'h' for seed mixture to be used.)

3.5.5.3 (See exibit 'h') (seed mixture)

3.5.5.4 SCS vegitation survey chart will be to compare the ground cover and productivity to measure the success of the revegitation operation. (Plate IX--1) When completed, ground cover ~~ground cover~~ will equal at least 90% of the cover listed on the survey chart, or if cover is determined to be adequate to control erosion.

3.5.5.5 **Reseeded areas will be monitored one time each month during the first growing season after planting. Planting will be repeated when and where necessary. When the percent of cover has reached the required level, it will be checked for cove and productivity in comparison to the SCS survey chart each of following two years.**

3.5 (cont.)

3.5.6 Schedule of reclaimation.

3.5.6.1 At the time of completion of underground mining operations temporary barricades will be placed at each portal or other mine openings to prevent unauthorized entry. These will be replaced by permanent seals within 60 days of the mine closure or of approval of the seals.

Removal of mining machinery, equipment, and structures;

6 months from the date of permanent closure.

Backfilling, regrading, and highwall reduction;

6 months from the date of completion of the removal of mine structures, snow depth and weather permitting or 6 months from the date work can begin, or 6 non-consecutive months if the winter months occur during that period of time.

Reseeding;

the first following season favorable for planting after completion of backfilling and grading

3.5.6.2 Reseeded areas will be monitored and replanted if necessary or if erosion gullies should occur before ground cover is sufficient to prevent such erosion gullies, they will be filled, regraded, and reseeded. (also see 3.5.6.1)

3.5.7 Cost estimate of reclamation.
(See exibit 'i')

CHAPTER III _ Exibit 'h'

SEED MIXTURE

Crested wheat grass	6# per acre
Luna pubescent wheat grass	2# per acre
Russian wild rye	6# per acre
Yellow sweet clover	6# per acre
Ladac alfalfa	2# per acre
Small burnet	2# per acre
Sage brush	1/4# per acre
Rabbit brush	1/4# per acre
Four wing salt brush	1/4# per acre

DIVISION OF OIL, GAS, AND MINING

BOND ESTIMATE

OPERATOR: Co-Op Mining Company
MINE NAME: Bear Creek Canyon Portal
LOCATION: Bear Creek Canyon
COUNTY: Emery County
DATE: July 28, 1980 Revised

	Operation	Amount	Rate	Cost
A.	CLEAN-UP			
	1. Removal of structures & equipment.	$3,000.00	Lump Sum	$ 3,000.00
	2. Removal of trash & debris.	$1,000.00	Lump Sum	$ 1,000.00
	3. Leveling of ancillary facilities pads and access roads.	7200 yd^2	$0.25/$yd^2$	$ 1,800.00
B.	REGRADING & RECONTOURING			
	1. Earthwork including haulage and grading of spoils, waste and overburden.	6 Acres 2500 cy	$1.23/cy	$3,075.00
	2. Recontouring of highwalls and excavations.	1 Acre, 45,000ft^3-1666	$1.23/cy	$2,050.00
	3. Spreading of soil or surficial materials.	7 Acres 5182 yd^3 200'x1000'x1	$1.23/cy	$6,374.00
C.	STABILIZATION			
	1. Soil preparation, scarification, fertilization, etc.	10 Acres	$25.00/Acre	$ 250.00
	2. Seeding or planting.	10 Acres	$150/Acre	$ 1,500.00
	3. Construction of terraces, waterbars, etc.	N/A	N/A	N/A
D.	LABOR			
	1. Supervision.	30 Hours	$10.00/hour	$ 300.00
	2. Labor exclusive of bulldozer time.	Included above		
E.	SAFETY			
	1. Erection of fences, portal coverings, etc.	3 portal covers	$1,500 each	$4,500.00
	2. Removal or neutralization of explosive or hazardous materials.	N/A	N/A	N/A
F.	MONITORING			
	1. Continuing or periodic monitoring, sampling & testing deemed necessary.	10 Acres reseed if necessary	$175/Acre	$1,750.00
G.	OTHER		Subtotal	$25,[illegible]
	13% inflation for 5 years.		Inflation	21,500.00
			TOTAL	$47,165.00

UMC 784.24 Transportation facilities.

The roads in the mine plan area are shown on the included maps and cross sections. The steep cut slopes are addressed in the included slope stability analysis by Dames and Moore.

Haul roads will be a width of 30 feet road surface, not including the width of drainage and/or diversion ditches at the side of the road. The grade is approx. 4%. They will be surfaced with at least 6 inches of crushed rock material.

Supply and equipment roads will be 20 to 25 feet wide, not including the width of drainage and/or diversion ditches at the side. The grade will vary from 4% to not more than 10%, and will be surfaced with crushed rock material wherever it is necessary to prevent rutting or mudding.

All roads will be sprinkled with water or chemically treated to control dust.

Dames & Moore

250 East Broadway, Suite 200
Salt Lake City, Utah 84111
(801) 521-9255
TWX: 910-925-5692 Cable address: DAMEMORE

February 20, 1981

Mr. Wendell Owen
Co-op Mining Company
Box 300
Huntington, Utah 84528

Dear Mr. Owen:

Summary Report
Slope Stability Analyses
Bear Creek Portal
Access Road
Near Huntington, Utah
For Co-op Mining Company

INTRODUCTION

This report summarizes the results of our stability analyses of the slopes along the Bear Creek Portal Access Road located northwest of Huntington, Utah.

PURPOSE AND SCOPE

The purpose and scope of this study were planned in discussions between Mr. Wendell Owen of Co-op Mining and Mr. Bill Gordon of Dames & Moore. In general, the purpose of this investigation was to analyze the static factor of safety of the side-cast cut and fill slopes along the Bear Creek Portal Access Road.

BACKGROUND

The Co-op Mining Company is in the process of reopening an abandoned coal mine at the Bear Creek Portal. Several abandoned facilities from a previous mining effort exist near the portal. We understand that the existing old portal will be used for ventilation of the new mine. The mine is located on a steep slope in the Wasatch Plateau and access to the portal is by a typical unsurfaced access road constructed by conventional side-cast methods.

Co-op Mining Company was issued a citation by the Department of Natural Resources Division of Oil, Gas, and Mining. The nature of the violation was with regard to the placement of side-cast cut and fill material on steep slopes (20 degrees or more). Regulations require that such fills achieve a minimum static factor of safety of 1.5.

An engineering geologist from Dames & Moore previously visited the site and performed a reconnaissance survey of the area and sideslopes in question. Laboratory tests have been performed on samples of the side-cast cut and fill material obtained at the site. These laboratory tests included sieve analyses and Atterberg Limits. The results of these laboratory tests, a discussion of our site reconnaissance survey, and a summary of our conclusions were presented in a report dated December 29, 1980*.

*"Report, Geotechnical Consultation, Bear Creek Portal, Near Huntington, Utah, For Co-op Mining Company."

SITE CONDITIONS

The general location of the Bear Creek Portal Access Road is shown on Plate 1, Plot Plan. Side-cast cut and fill areas as determined by others are also indicated on Plate 1. The slopes in the area of the Bear Creek Portal are generally steeper than 20 degrees and the access road has been constructed by conventional side-cast methods. The material being excavated and forming this side-cast cut and fill typically consists of fine and coarse gravel and cobble sized pieces of silty sandstone in a sandy and silty clay matrix. Calcium carbonate derived from the cement in the sandstone is also present.

The surface of the side-cast material is quite firm, which we believe to be related to the composition of clay and calcium carbonate in the soil. The clay acts as a binder and gives the soil cohesive strength and the calcium carbonate tends to cement the soil particles together. As discussed in our previous letter, the calcium carbonate cement in the soil probably provides a significant component of the factor of safety of the side-cast fill material. However, the determination of a numerical value for the influence of the calcium carbonate cementation would be very difficult to accurately determine.

SOIL PROPERTIES

Based on the results of laboratory tests performed on samples of the side-cast cut and fill material from the Bear Creek Portal

site and our experience with similar soils, we have assumed the following soil properties:

Side-Cast Fill Material

Angle of Internal Friction	$\phi = 26^{\circ}$
Cohesion	C = 350 psf
Unit weight soil	δ = 98 pcf

Natural Soils

Angle of Internal Friction	$\phi = 26^{\circ}$
Cohesion	C = 700 psf
Unit weight soil	δ = 120 pcf

SLOPE STABILITY ANALYSIS

To aid in evaluating the stability of the side-cast cut and fill material of the Bear Creek Portal Access Road, a computer slope stability analysis was performed. The computer analysis utilized a simplified Bishop's Method in computing the long-term static factor of safety of the slopes. Due to the limited laboratory and field data, and the uncontrolled method in which side-cast cut and fill materials are placed, ultra conservative soil strength parameters were used in the computer analysis. A Geometric cross-section of a critical section utilized in the analysis is shown on Plate 2, Slope Cross Section. It was also assumed that a phreatic water surface would not develop in the slopes of the embankment.

The computer program analyzed the slope stability by searching a specified coordinate grid area for the center of the circle

having the lowest factor of safety. The slope stability analyses was performed using a total of four separate coordinate grid areas. The number of trial failure arc centers analyzed in each of these four areas varied from [illegible] to [illegible]. As indicated on Plate [illegible], this analysis indicated a minimum static factor of safety varying from 1.43 to 2.15.

Copies of the results of the computer analysis for each coordinate grid area are included with this report.

DISCUSSIONS AND RECOMMENDATIONS

GENERAL

Supporting data upon which our recommendations are based have been presented in the previous sections of this report and in the previous Dames & Moore report dated [illegible].

SLOPE STABILITY

The computer slope stability analyses indicated a minimum static factor of safety varying from 1.43 to 2.15 for the critical arcs analyzed.

It should be noted that the factor of safety of the critical arc which cuts deep into the slope does not consider the presence of bedrock, increasing strength of the natural soils with depth, or the effect of the [illegible] carbonate cementation in the soil. If the above were incorporated into the analysis the factor of safety would be significantly increased.

Stability of the slopes will be influenced by the degree of saturation of the existing soils. Therefore, surface drainage must be channeled to minimize runoff over the slopes. However, during wet periods of the year, small localized slides and sloughs should be anticipated along the slopes. However, these occurrences should be minor. The performance of these side-cast cut and fill slopes is anticipated to be similar to virtually identical side-cast cut and fill slopes along the nearby road leading to the Trail Canyon Portal. These slopes have been stable since their construction, varying from 10 to 25 years ago.

Based on our slope stability analysis and observations made during our reconnaissance visit to the site, it is our opinion that the side-cast fill material located along the Bear Creek Portal Access Road generally has a long-term static factor of safety of 1.5 or greater and will perform in a satisfactory manner.

oOo

We appreciate the opportunigy of performing this service for you. If you have any questions or require additional information, please contact us.

Very truly yours,

DAMES & MOORE

William J. Gordon
Associate
Professional Engineer No. 3457
State of Utah

Douglas G. Beck
Staff Engineer

WJG/DGB/wb

Attachments"

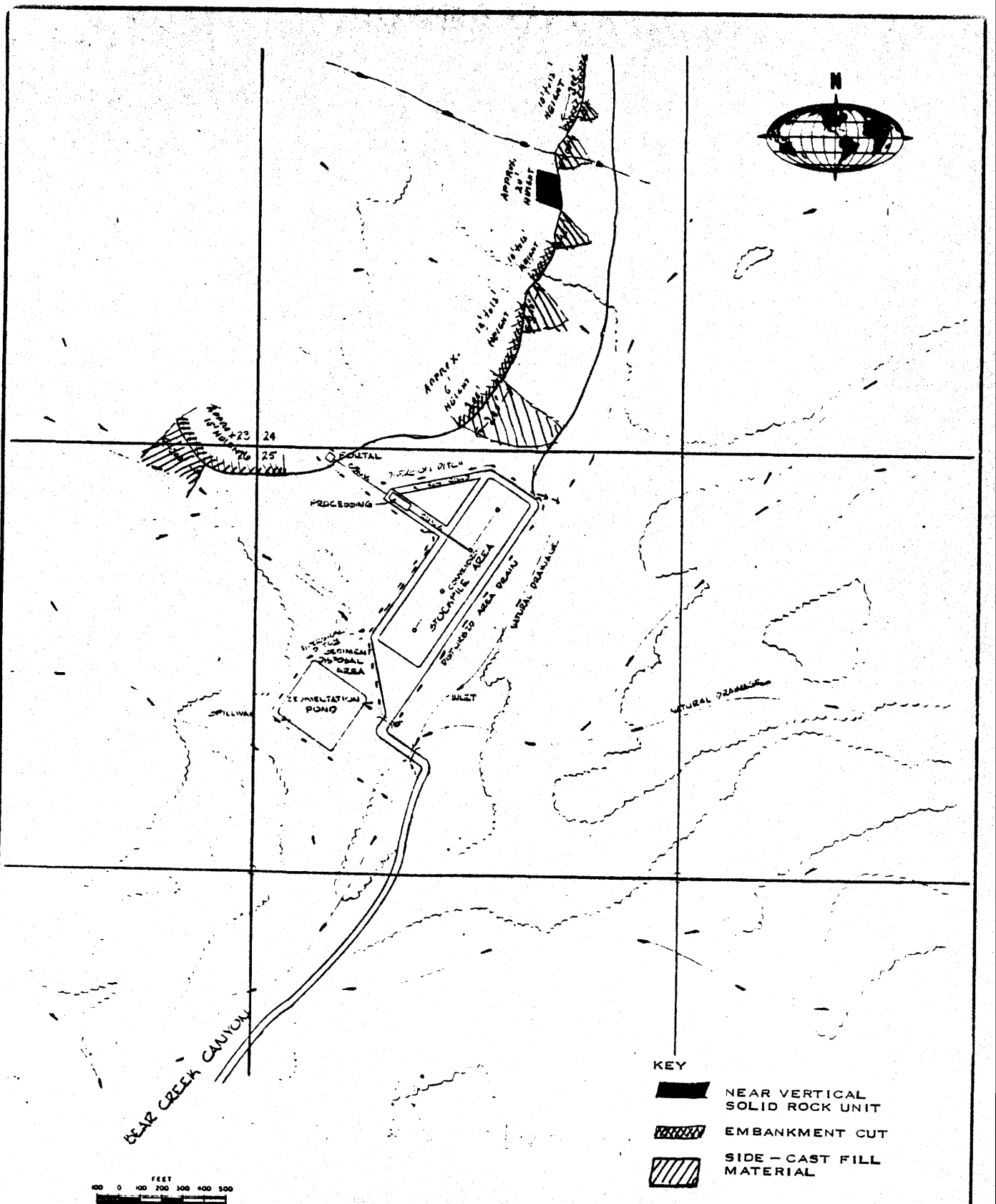
Plate 1 - Plot Plan
Plate 2 - Slope Cross-Section
Computer Anlaysis Results

cc: Department of Natural Resources
Division of Oil, Gas and Mining (2)

REVISIONS BY DATE

BY DATE FILE

CHECKED BY DATE

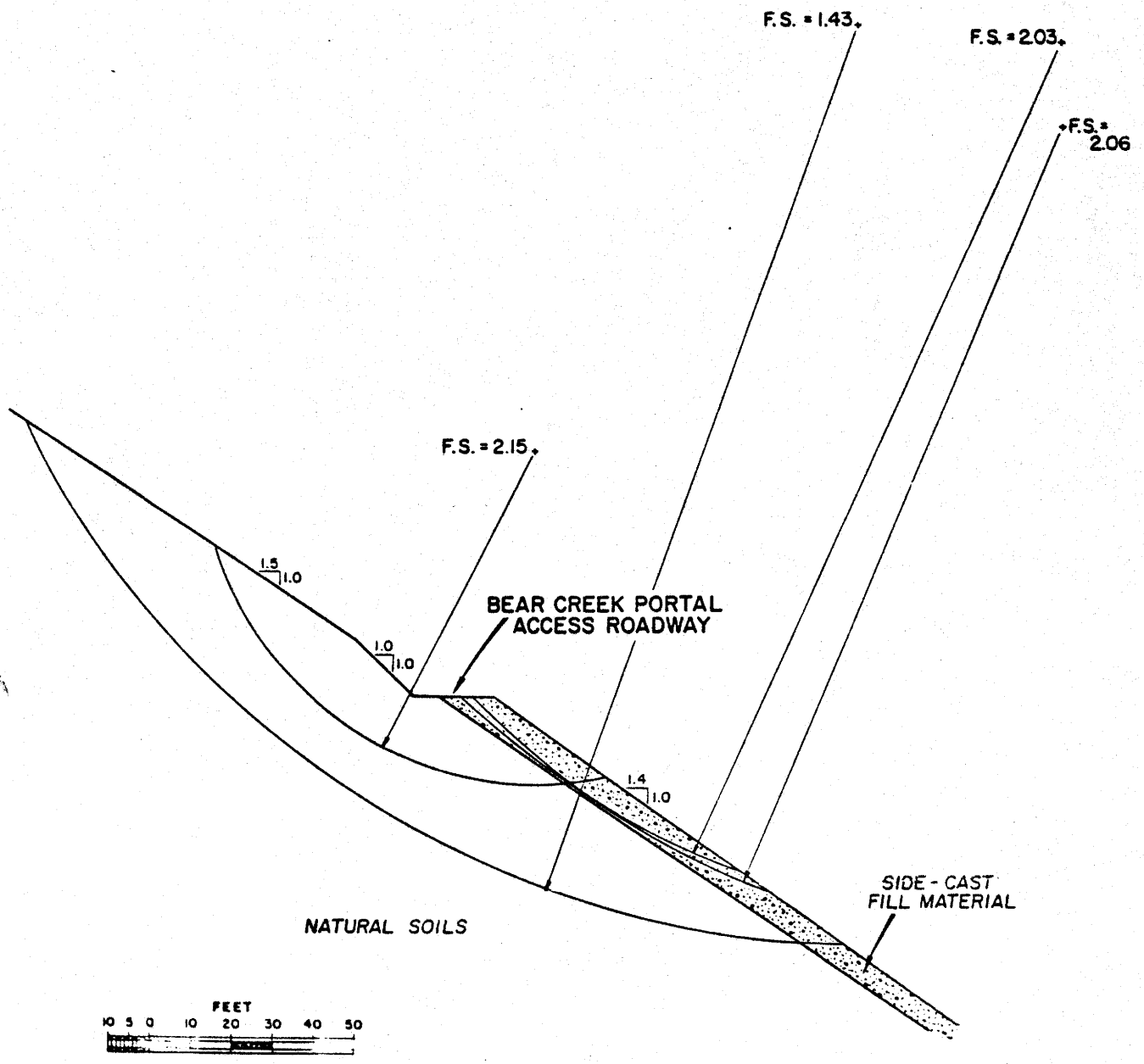


PLOT PLAN

REFERENCE
ADAPTED FROM PRINT
SUPPLIED BY OTHERS.

DAMES &

PLATE 1



SLOPE CROSS SECTION

PLATE 2

SLOPE STABILITY ANALYSIS

DATE OF LAST REVISION - DEC 11 78

DATE RUN - 02/19/81 TIME RUN - [illegible]

0346101206 6093 GMB 022081 STABILITY [illegible] FILL

****

INPUT MODE = 1
EARTHQUAKE COEFFICIENT = 0.000
PORE PRESSURE IS DEFINED BY WATER LINE [illegible]
TOTAL NUMBER OF SOIL LINES = 6 [illegible] WATER LINES = 0

SOIL LINE NO	LEFT-X	LEFT-Y	RIGHT-X	RIGHT-Y	WT BELOW LINE-PCF	FRICT. ANGLE(DEG) (OR C/P RATIO**) ABOVE	BELOW	COHESION-PSF ABOVE	BELOW	PORE PRESSURE RATIO ABOVE	BELOW	NEW BELOW	NUU ABOVE	NUU BELOW
1	1018.00	1180.00	1086.00	1134.00	120.0	0.00	26.00	0.0	700.0	0.000	0.000	0	0	[illegible]
2	1086.00	1134.00	1100.00	1120.00	120.0	.00	26.00	0.0	700.0	0.000	0.000	0	[illegible]	[illegible]
3	1100.00	1120.00	1106.00	1120.00	120.0	0.00	26.00	0.0	700.0	0.000	0.000	0	[illegible]	[illegible]
4	1106.00	[illegible]	1120.00	1120.00	98.0	0.00	26.00	0.0	330.0	0.000	[illegible]	0	[illegible]	[illegible]
5	1120.00	1120.00	1232.00	1060.00	98.0	0.0	26.00	0.0	350.0	0.000	[illegible]	0	[illegible]	[illegible]
6	1106.00	1120.00	1270.00	1042.	[illegible]	[illegible]	26.00	350.0	[illegible]	0.000	[illegible]	0	0	0

NOTE: IF(NEW.EQ.1) SOIL IS NEWLY PLACED AND [illegible] CONSOLIDATE [illegible] ERS WITH [illegible]
IF(NUU.EQ.1) SOIL WILL BE LOADED UNDER UNDRAINED CONDITIONS BY NEWLY PLACED [illegible]
VALUES MARKED WITH ** ARE C/P RATIOS FOR LAYERS WITH NUU=1

UNIT WEIGHT OF WATER = 62.40 NUMBER OF COLUMN [illegible]

MODE OF PROGRAM OPERATION = 3

CENTER VARIATIONS	MIN-X	MAX-X	MIN-Y	MAX-Y	DX	DY
	1240.00	1260.00	250.00	[illegible]	[illegible].00	10.00

RADIUS TANGENTS MAX= [illegible]50.00 MIN= [illegible].00 [illegible]R= [illegible]

RESULTS

****

ENTR NO	RAD	CENTER COORDINATES		CIRCLE	FACTOR OF SAFETY	SUM	SUMS	TRY
NO		4060.26	170.08	[illegible]				

RDY
EDIT,OLD,GMB
[illegible] 0.32 READY * WIDTH=/[illegible]/FIND/TABUL/$P,..*

TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADII IN PARENTHESES)

Y COORDINATES	X COORDINATES 12[illegible]	[illegible]50.0	1260.0
1280.0	1.602 (272.)	[illegible] (227.)	0.026 (219.)
1270.0	1.877 (212.)	2.0[illegible] (242.)	[illegible]
1260.0	1.953 (202.)	2.119 (202.)	[illegible] (202.)
1250.0	[illegible]	2.084 (188.)	2.575 (172.)

READY END

TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADII IN PARENTHESES)

Y COORDINATES	X COORDINATES 1210.0	1215.0	1220.0	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1.504 (244.)	[illegible] (249.)	[illegible] (252.)	1.4[illegible]	1.549 (212.)	[illegible]
1305.0	[illegible] (230.)	[illegible]	[illegible] (247.)	1.4[illegible] (242.)	[illegible]	1.369 (242.)	[illegible]
1300.0	1.442 (266.)	[illegible] (2[illegible])	[illegible]	[illegible]	1.57[illegible]	1.59[illegible]	[illegible]
1295.0	[illegible] (255.)	1.427 (227.)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.45 (2[illegible])	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1.385 (217.)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADII IN PARENTHESES)

Y COORDINATES	X COORDINATES [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] (80.)	[illegible]	[illegible]	[illegible]	[illegible]
1175.0	2.576 (77.)	[illegible]	[illegible]	[illegible]	[illegible]
1170.0	2.682 (72.)	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2.811 (67.)	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	2.984 (62.)	[illegible]	[illegible]	[illegible]	[illegible].5[illegible] (62.)

TABULATION OF MINIMUM SAFETY FACTORS
(CRITICAL RADII IN PARENTHESES)

Y COORDINATES	X COORDINATES 1120.0	1121.0	[illegible]	[illegible]	[illegible]
1180.0	5.342 (82.)	2.219 (79.)	[illegible]	[illegible] (80.)	[illegible] (82.)
1175.0	4.061 (77.)	[illegible] (76.)	[illegible].225 (77.)	[illegible]	[illegible]
1170.0	2.181	[illegible] (72.)	2.319	[illegible] (72.)	[illegible]
1165.0	[illegible] (67.)	[illegible]	[illegible]	[illegible] (67.)	[illegible]
1160.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

UMC 817.22 Topsoil; removal

Topsoil shall be removed from areas to be disturbed prior to that disturbance, except in areas where removal by the use of conventional machines would be unsafe or impractical because of the slope or other conditions of the terrain or because of the rockiness or limited depth of the soil.

UMC 817.23 Topsoil; storage

Topsoil will be stored in the permit area and will be protected from wind and water erosion. Topsoil stockpiles will be so designated by sign to prvent its use or misuse by company or other personnel.

UMC 817.24 Topsoil; redistribution

At the time of final reclamation of the mine plan area, the area shall be regraded to its approximate original contour, and the topsoil shall be redistributed over the surface, prepared for reseeding and reseeded as described in the section on reclamation.

UMC 817. Topsoil; Nutrients and soil amindments.

In view of the fact that there is a continuation of study, experiment and progress in all fields of scientific endeavor, including soil handling and nutrients, it is the opinion of the operator that it will be better to obtain the best information and methods that are available at the time of reclamation than to determine this at the present time.